

**City of Seattle
Municipal Stormwater NPDES Permit**

2003 Annual Report

Providing an update on the status of stormwater program activities conducted during 2003 with updates, as appropriate, for 2004.

Submitted pursuant to Special Condition S10 of the National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for discharges from municipal separate sewers for the Cedar/Green Water Quality Management Area.

Municipal Stormwater NPDES Permit No. WASM 23003



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September 2, 2004

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2003 Stormwater Management Program Update Report

1. INTRODUCTION

This report is submitted by the City of Seattle pursuant to Special Condition S10 of the National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for discharges from municipal separate storm sewers for the Cedar/Green Water Quality Management Area. Seattle received coverage under the NPDES Municipal Discharge Permit from Washington State Department of Ecology (Ecology) in 1995. In 1997, Seattle's Stormwater Management Program (SWMP) was approved by Ecology as meeting the requirements of that permit. The report, highlighting various stormwater runoff management activities conducted by the City of Seattle, covers the 12-month period between January 1, 2003, and December 31, 2003, with updates as appropriate through mid-2004.

This report is divided into four sections.

1. Background: Stormwater and the City of Seattle. This section contains an overview of the nature of urban stormwater runoff and the challenges facing fully built environments like Seattle. It also provides an overview of the organizational responsibilities of key departments in the City involved in stormwater management and water quality.
2. Seattle's Stormwater Management Program Components. In this section, the various elements of Seattle's stormwater programs are summarized. Accomplishments during the reporting period are included and, for readers desiring additional information, a point of contact is provided for each program element.
3. Other Permit Reporting Requirements. The City's NPDES Municipal Stormwater Discharge Permit contains mandatory reporting elements that do not properly fit under one of the program headings in the previous section. These mandatory reporting elements are included in this section. Examples include as fiscal analysis and changes in permit coverage area.
4. Next Steps. This section reflects on the challenges of stormwater management in the City of Seattle.

Two appendices are included at the end of this report:

- o Appendix A provides a listing of current stormwater management programs and staff points of contact
- o Appendix B cross-references the reporting requirements contained in the 1995 NPDES Municipal Stormwater Permit with the appropriate sections contained in this report

Comments or questions regarding the overall organization or content of the report can be directed to Darla Inglis, Seattle Public Utilities Resource Planning Division, at 206-233-7160 or darla.inglis@seattle.gov

2. BACKGROUND: CITY OF SEATTLE AND STORMWATER

2.1 STORMWATER AND THE URBAN ENVIRONMENT

Urban stormwater runoff is the water that runs off surfaces such as rooftops, paved streets, highways, and parking lots. Runoff can also come from graveled areas and hard grassy surfaces like lawns and play fields. Urban stormwater runoff can be a problem for several reasons.

Flooding: In less urban areas, much of the rainfall is intercepted by trees and vegetation or infiltrated into the soil. In urban areas like Seattle, most of the rainfall remains on the surface where it can collect in low-lying areas and cause flooding.

Human Health: Untreated stormwater can contain toxic metals, organic compounds, and bacterial and viral pathogens. Untreated stormwater generally is not of drinking water quality and can lead to closures of swimming areas.

Aquatic Environment: In urban areas, our creeks, streams, and rivers can be harmed by urban stormwater. Because so little of the rainfall is intercepted or infiltrated, high volumes of runoff can arrive in these water bodies causing erosion and sedimentation. Stormwater can also adversely affect water quality by carrying the pollution from roadways, lawns, and business activities.

In Seattle, as it collects on roadways, lawns, gutters, and other impervious surfaces, stormwater begins to flow through a variety of systems. These include:

Natural Drainage System: Swales, ravines, and stream corridors such as Thornton Creek or Longfellow Creek are all examples of natural drainage systems. Natural drainage systems cross privately and publicly owned property.

Ditch and Culvert System: This kind of system involves a combination of surface ditches and culverts usually located in the public right-of-way that convey stormwater to a natural drainage system or a public storm drain.

Public Storm Drain: This public drainage system is wholly or partially piped and is designed to carry only stormwater. Public storm drains convey stormwater to a natural drainage system or directly to receiving waters such as Lake Union or Lake Washington.

Public Combined Sewer: Seattle's Combined Sewer System conveys both stormwater and wastewater through a system of pipes to King County's treatment facility at West Point. The treated water is released into Puget Sound.

To meet the challenges of urban runoff, urban areas like Seattle must implement comprehensive stormwater management programs. These programs include capital projects to address both flooding and water quality concerns, maintenance activities to keep facilities functioning properly, and a range of programs designed to influence the actions of everyone who works or lives in the watershed. Many of these programs, primarily those related to the *quality* of the stormwater (as opposed to the *quantity* of stormwater) are described in this report.

2.2 SEATTLE DEPARTMENTS INVOLVED IN STORMWATER MANAGEMENT

Among the many departments serving Seattle, the four departments and one office described below are most involved in programs and projects relating to stormwater management and receiving water impacts.

Seattle Public Utilities

Seattle Public Utilities (SPU) was formed in 1997 during a municipal reorganization that placed the four rate-supported utility services of solid waste, drinking water, wastewater and drainage into one City department. Prior to the reorganization, Seattle Engineering Department's Drainage and Wastewater Utility (DWU) performed drainage planning. Today, SPU is the designated lead department for managing stormwater, including meeting stormwater regulatory requirements, conducting water quality programs, and managing drainage-related capital projects.

Department of Planning and Development

The Department of Planning and Development (DPD), formerly known as the Department of Design, Construction and Land Use (DCLU), is the City department responsible for developing, administering, and enforcing development standards. It is DPD that issues development permits as required under Seattle's Stormwater, Grading and Drainage Control Code (Seattle Municipal Code 22.800 – 22.808) and inspects sites prior to and during construction. As part of the side sewer permit, inspections and complaints program transfer, DPD is currently doing the permitting and inspections. It was agreed that SPU would eventually manage customer complaints and inquiries (investigation and response) for non-permit work. Complaint handoff to DPD will occur when a Notice of Violation needs to be issued. All complaints and inquiries related to existing side sewer facilities would be directed to SPU Customer Service.

Seattle Department of Transportation

Seattle Department of Transportation (SDOT) is responsible for the City's streets and bridges, bike paths, street trees, traffic operations. SDOT performs such roadway maintenance activities as street sweeping and snow and ice control, and is currently responsible for issuing permits for side sewers to connect to the City's mainline system. The Capital Projects Division of SDOT oversees all aspects of Transportation Capital Improvement Programs (CIPs) and coordinates development and implementation of large-scale city projects.

Office of Sustainability and the Environment

The Office of Sustainability & Environment (OSE) was created in the fall of 2000 to help put sustainability into practice, both within City government and in the community at-large. While OSE's primary focus is on "municipal sustainability" (more sustainable City operations, facilities, and services), this office also seeks to promote and increase "community sustainability" (more sustainable practices by businesses, other institutions, and individual households and citizens). One of OSE's missions is to provide leadership, tools, and information to help City government and other organizations use natural resources efficiently, prevent pollution, and improve the economic, environmental, and social well-being of current and future generations. Among the more recent endeavors has been a citywide effort to reduce pesticide use.

Seattle Parks and Recreation

Responsible for several hundred parks and park facilities, Seattle's Department of Parks and Recreation (SPR) is a key player in environmental stewardship. During 2001, SPR trained its staff in comprehensive Best Management Practices for various maintenance activities, reduced

pesticide use, worked to remove invasive plants and replant native species, and continued its partnership with Seattle Public Utilities on creek improvement projects. Highlights of SPR's accomplishments during 2003 can be found in its annual report, which is available at

<http://www.cityofseattle.net/parks/Publications/annualreport.htm>

3. STORMWATER MANAGEMENT PROGRAM COMPONENTS

In this report, Seattle's stormwater- and water quality-related programs are organized into twelve functional categories as shown in Figure 1. The categories are:

Comprehensive Stormwater Planning: Includes planning processes underway used to further develop and enhance Seattle's stormwater management programs.

Partnerships: Activities aimed at coordinating stormwater-related policies, programs, and projects among jurisdictions within a watershed, and among Seattle's departments sharing similar responsibilities.

Regulations and Technical Standards: Seattle's ordinances and SPU/DCLU Directors' Rules are designed to control runoff from new development, redevelopment, and construction activities. Regulations also address source control and pollution prevention at existing commercial and residential areas.

Permitting, Inspections, and Enforcement: Programs that ensure proper application of and compliance with adopted regulations and standards.

Pollution Prevention: These programs are aimed at reducing or eliminating pollution before it can be picked up by stormwater runoff and conveyed to receiving waters.

Public Involvement, Education and Stewardship: In this category are the variety of programs whose purpose is to provide opportunities for individuals and groups to become involved in environmental and water quality activities, and learn how to be better stewards of our natural resources.

Illicit Discharge Reduction: An illicit discharge occurs when something other than stormwater is allowed to enter one of our conveyance systems. The programs listed under this category are hazardous spill response and illegal dumping.

Operations and Maintenance – Drainage System: These programs help Seattle maintain its public drainage infrastructure.

Operations and Maintenance – Roadways: In this category are described the programs operated by SDOT to reduce stormwater impacts from public streets.

Municipal Training: Training occurs throughout many of the programs within other programmatic categories. Under this category is listed a new training program specifically aimed at improving drainage system maintenance.

Information & Data Collection, Analysis & Management: This category includes many of the programs that collect and compile information needed to evaluate performance of programmatic activities and to assess the effectiveness of policies, standards, programs, and projects over time.

Capital Improvement Program: This category includes primarily SPU-sponsored capital projects involving facilities or other improvements that address stormwater impacts.

Additional details on these programs are provided in this report.

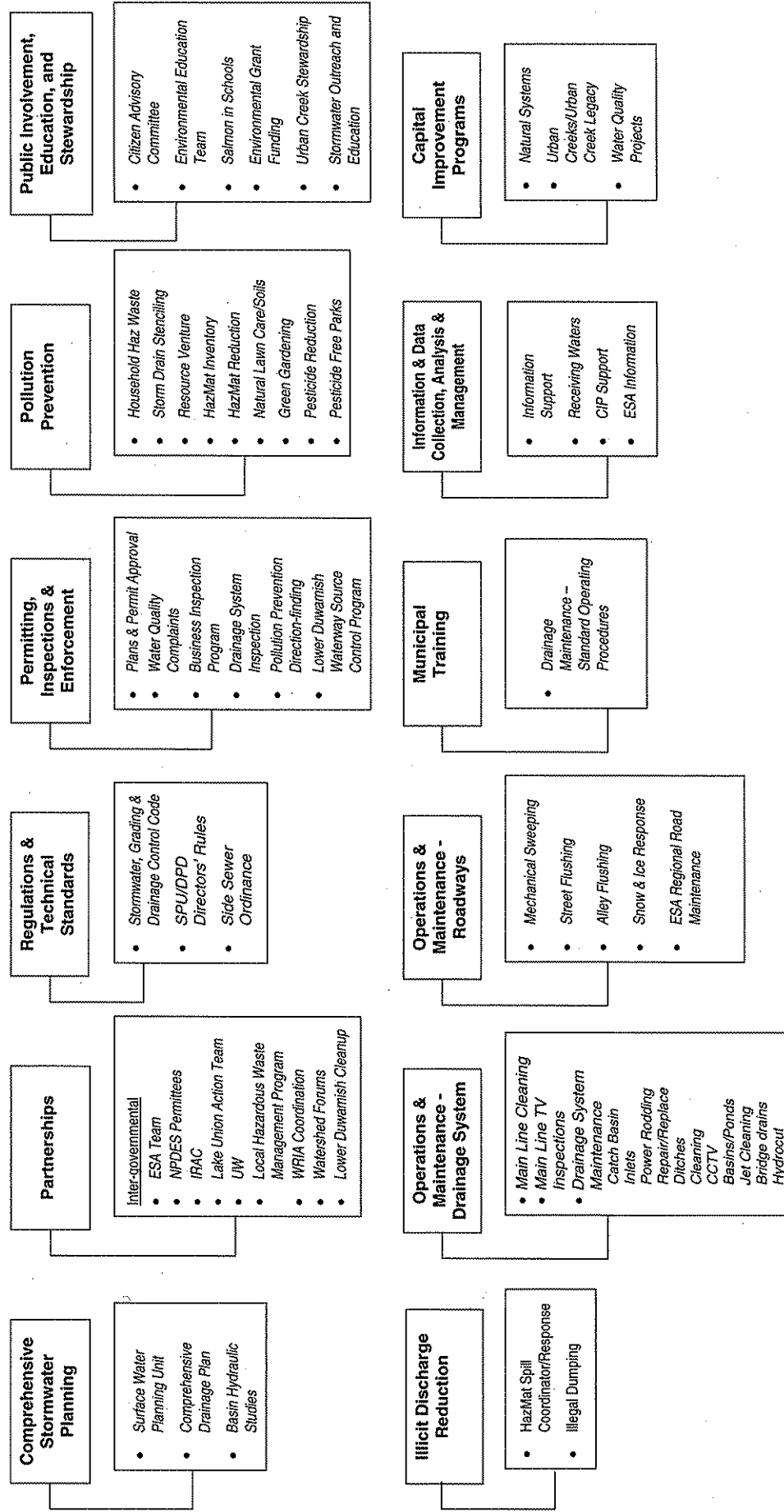


Figure 1. City of Seattle Stormwater Management Programs

3.1 COMPREHENSIVE STORMWATER PLANNING

SPU, as the lead stormwater management department for the City of Seattle, is involved in a number of planning endeavors designed to improve delivery of services and enhance environmental quality. Highlights of major planning efforts are provided below.

3.1.1 Surface Water Planning Unit

In 2004, SPU separated Drainage and Wastewater planning into two distinct units. The primary duties of the Surface Water Planning Unit include: updating the Comprehensive Drainage Plan, policy development, project and program "specifying," and tracking and managing the drainage capital fund. The Unit is organized under four core program areas: Water Quality, Flooding and Conveyance, Landslides, and Aquatic Habitat. Several milestones for 2004 include:

- Completion of the 2004 Comprehensive Drainage Plan Update,
- Natural Drainage System Program received the "Innovations in Government Award" from Harvard's Ash Institute, recognizing SPU's alternative stormwater management program.
- The Unit began a major stormwater code revision effort to respond to the Department of Ecology's Western Washington stormwater manual.

Denise Andrews (206) 684-4601

3.1.2 Comprehensive Drainage Plan Update

In early 2002, SPU began a two-year project to update its 1995 Comprehensive Drainage Plan (CDP). When complete, the new CDP will chart a 20-year course for SPU's Drainage Programs, set policies around habitat and water quality work implemented by the City, define level of drainage service, and identify key action items by basin. The CDP is expected to be finalized in 4th Quarter, 2004 and is expected to also include:

- A vision for surface water management that includes Seattle creeks, shoreline, and lakes as well as traditional drainage infrastructure;
- A fully developed Natural System Program that optimizes water quality and quantity management and mobility goals in the right-of-way;
- Recommendations for an expanded water quality program with increased monitoring and pollution prevention activities;
- Recommendations for flow control to creek watersheds to reduce stormwater runoff impacts;
- A robust 6-year candidate drainage CIP with recommendations for operational and enforcement programs many of which are directed toward the benefit of Seattle's aquatic resources.

Within the CDP, the level of drainage service is expected to include:

- Public safety as it relates to drainage;

- Protection and, where feasible, enhancement of water quality and habitat for key aquatic resources;
- Compliance with regulatory requirements; and
- Operation and management of public investment in the drainage infrastructure.

These services are expected to be applied in a manner that reflects geographic differences within the city and the corresponding service needs. Links with other City Departments and the services they provide will be created in order to optimize benefits to ratepayers.

The proposed Comprehensive Drainage Plan is currently available at

http://www.seattle.gov/util/About_SPU/Drainage_&_Sewer_System/Plans/Comprehensive_Drainage_Plan/index.asp

Darla Inglis (206) 233-7160

3.1.3 Basin Hydraulic Studies

Norfolk Drainage Basin

The Norfolk Basin Drainage Study - completed in May 2002 - evaluated the existing drainage system, identified existing problem areas, developed preliminary improvement alternatives, and recommended a phased capital improvement plan. Implementation of the basin plan began in 2003 with the initiation of the Martin Luther King Way and Norfolk Street Stormwater Improvement Project. The planning phase of this project was completed in 2004; preliminary engineering is expected to commence in 2005.

This project, as currently proposed, would reduce flooding problems along MLK Way S and adjacent streets by rehabilitating the existing system, eliminating bypasses to the sanitary sewer system and providing a functioning conveyance system for future roadway and drainage improvements along MLK Way that are proposed for construction by Sound Transit in 2007. The project would also remove petroleum contaminated sediments from the existing system, provide improved maintenance access for future cleaning, increase the carrying capacity of the system to meet a 25-year performance level, improve stormwater quality treatment, and reduce overall long-term maintenance costs.

Gary Schimek (206) 615-0519

South Park Drainage Basin

The South Park Drainage Study – completed in December 2002 - evaluated the existing drainage system, identified existing problem areas, developed preliminary improvement alternatives, and recommended a phased capital improvement plan. Implementation of the basin plan began in 2003 with the initiation of two distinct capital improvement projects. The first was the 4th Avenue South and South Trenton Stormwater Improvement Project. The second was the 8th Avenue South and South Cambridge Street Stormwater Improvement Project.

These two projects were temporarily delayed in 2004 during the early planning phase to conduct a related modeling study. The purpose of the modeling study is to investigate the

feasibility of diverting stormwater from the upper and middle South Park sub-basins to a riparian corridor within the Washington State Department of Transportation Right of Way. The modeling study is expected to be completed in late 2004. The results of this study may influence the work associated with the above noted capital improvement projects.

Gary Schimek (206) 615-0519

Densmore Drainage Basin

The Densmore Drainage Study - completed in May 2003 - evaluated the existing drainage system, identified existing problem areas, developed preliminary improvement alternatives, and recommended a phased capital improvement plan. Implementation of the basin plan began in 2003 with the initiation of the 125th and Aurora Avenue Stormwater Improvement Project. The planning phase of this project was completed in 2003; the preliminary engineering phase of this project is expected to be completed in late 2004.

Gary Schimek (206) 615-0519

Thornton Creek – Basinwide Flow Control Plan

The principal objectives of the Thornton Creek Basinwide Flow Control Plan are to identify options to control flooding and improve fish and wildlife habitat. The detailed analysis of Thornton Creek hydrologic conditions began in 1998 with a limited reconnaissance and initial stream gauging at selected locations. Flow data collected during the period of study were then used to calibrate hydrologic and hydraulic models. Three separate models were selected to simulate runoff response of the Thornton Creek basin and flow routing through principal conveyance systems. The three models were the Expert Stormwater management Model (XP-SWMM), the Hydrologic Simulation program – FORTRAN (HSPF), and the Hydraulic engineering Center – River Analysis System (HEC- RAS). The calibrated models were used to establish existing conditions and predict problem areas. Potential solutions were then developed to address the identified problems. A Draft Report was completed in April 2001 documenting the hydraulic analysis and alternatives evaluation performed for the drainage basin. Results from the draft report will be used to identify future CIP projects.

The Comprehensive Drainage Plan for Seattle Public Utilities that addresses flood control and fish and wildlife habitat was completed.

During 2003 and the first half of 2004, the following projects in the Thornton Creek Basin were in the CIP process:

- 1) Pinehurst project (located upstream of Kramer Creek) is in the design phase. Pinehurst is a natural drainage system project that will improve water quality and reduce flows through infiltration.
- 2) Downstream of Northgate at Park #6, SPU provided several fish habitat enhancement features during the summers of 2003 and 2004.
- 3) SPU purchased several properties along 36th Avenue Northeast at Meadowbrook pond for sediment collection efficiency to improve water quality.

- 4) In July 2003, SPU completed construction of Jackson Park Detention Phase II project. This project added 25 acre-ft of detention to assist in flood control and creek restoration of 2300 feet of the North Branch of Thornton Creek to improve fish and wildlife habitat within Jackson Park Golfcourse.
- 5) In 2004, preliminary engineering and flow monitoring is occurring for Kramer Creek (tributary to South Branch of Thornton Creek). Historically, properties along 30th Avenue Northeast between Northeast 107th and 110th Street flood during storm events greater than a 2-year event.
- 6) At Lake City Way Northeast and Northeast 100th Street, the existing fish ladder was repaired during the summer of 2004 to enhance fish habitat.
- 7) Currently preliminary engineering for daylighting the south branch of Thornton Creek at Northgate is occurring to improve fish and wildlife habitat.

Gary Schimek (206) 615-0519

3.1.4 Public Participation in Planning Processes

(See 3.6.1, Citizen Advisory Committee)

3.2 PARTNERSHIPS

Managing stormwater, reducing pollution, and improving the conditions of our receiving waters involves the combined efforts of many Seattle's departments as well as partnerships with other jurisdictions. Most of these collaborative efforts are described elsewhere in this report.

3.2.1 Intergovernmental Coordination

Below are some selected examples of how the City of Seattle is involved in partnerships with other jurisdictions sharing responsibilities within our watersheds.

ESA Team

In May 1999, the National Marine Fisheries Service (NMFS) listed the Puget Sound chinook salmon (*Oncorhynchus tshawytscha*) as *threatened* under the Endangered Species Act (ESA) and in December 1999 the US Fish and Wildlife Service (USFWS) added the coastal bull trout (*Salvelinus confluentus*) to the threatened list. In 2001, the federal case Alsea Valley Alliance versus Evans resulted in NOAA fisheries reassessing salmon population risk analyses that were the foundation of its regulatory rules on the West Coast to protect threatened or endangered salmon population. In 2004, as a result of the new risk analyses, NOAA fisheries has or will issue new policies and rules related to hatchery management, critical habitat designation, and listings of threatened or endangered salmon populations. It is not clear what the full effect of these policies and rules will be. However, it is expected that Puget Sound Chinook will continue to be listed as a threatened species and that their critical habitat will be better defined. Similarly, in 2004, USFWS is also proposing critical habitat designations for Bull Trout as a threatened species. Since the original listing in 1999, Seattle's response has included the formation of an interdepartmental, citywide ESA Team. The ESA team focuses on five primary issues: (1) negotiations with NOAA Fisheries and United States Fish and Wildlife Service (USFWS), (2) regional coordination with Shared Strategy and Tri-County, (3) supporting regional watershed action planning, especially in WRIAs 3&4, 7, 8, and 9, (4) developing salmon research and habitat investments designed to protect and restore Seattle's major aquatic environments, and (5) departmental implementation of best management practices and appropriate mitigation of capital projects. In addition, SPU's capital projects now

undergo Triple Bottom Line (TBL) analysis in a much more rigorous form than in past years. TBL analysis requires assessment of the financial, social, and environmental benefits and costs of a project. The ESA Team includes policy representatives from each department who have access to the Director of his/her Department, including SPU, City Light, SDOT, Parks, Design/Construction and Land Use. Chuck Clarke, Director of SPU, is the executive sponsor of the interdepartmental responsibility and reports to the Mayor's Office.

Martin Baker (206) 684-5984

Coordination among NPDES Municipal Stormwater Permittees

The City of Seattle is a regular participant in the NPDES Municipal Stormwater Permittee Interagency Working Group, an ad hoc collective whose members represent all the current NPDES stormwater-permitted jurisdictions in the State of Washington, as well as the Port of Seattle, Port of Tacoma, and the Washington State Department of Ecology. The group did not meet in 2003 as Ecology continued to direct the majority of their resources on items such as producing a Stormwater Management Manual for Eastern Washington, working toward a Phase II NPDES Municipal Permit, and addressing other emerging legal issues. It is anticipated that the group will begin meeting on a regular basis when the draft Phase I Stormwater NPDES permit is made available by Ecology. In August 2003, Seattle was chosen as one of 20 representatives on the Westside Stormwater Group. This group worked with Ecology to produce a report to the Washington State Legislature summarizing the range of perspectives on stormwater permitting and management issues, identifying alternative courses of action and their implications, and delineating areas of agreement and disagreement.

Darla Inglis (206) 233-7160

Interagency Resource for Achieving Cooperation

Seattle Public Utilities regularly participates in the Interagency Resource for Achieving Cooperation (IRAC) program. IRAC began in mid-1993 as a forum for state and local regulatory agencies to share their diverse regulatory perspectives. IRAC's mission is to provide the forum and structure for governmental agencies to coordinate regulations that protect human health, safety and the environment. A primary goal of IRAC is to bring agencies together to address gaps, overlaps, and inconsistencies relating to regulatory issues. Two representatives of SPU are presently serving on the IRAC Advisory Committee. SPU is also actively involved in three IRAC workgroups: Outdoor Restaurant Grease Workgroup, Troublesome Sites Workgroup and the Lead Workgroup.

Ellen Stewart (206) 615-0023

Lake Union Action Team

The Lake Union Action Team (LUAT) was formed in 1988 as part of Ecology's Urban Bay Action Program. The goals of the Urban Bay Action Program include protecting ecosystems from further degradation, restoring damaged areas, and protecting the beneficial uses of the water body. The LUAT is a multi-agency body that supports the goals of the Urban Bay Action Program by coordinating regulatory and source control efforts in the Lake Union drainage basins. Local, state and federal regulators involved with the Lake Union watershed meet on a bimonthly basis. Members include representatives from Seattle Parks and Recreation, Seattle Department of Design, Construction and Land Use, King County Industrial Waste Program, King County Hazardous Waste Program, King County Wastewater Treatment Division, Port of Seattle, Washington State Department of Ecology, Washington State Department of Natural

Resources, Washington State Department of Fish and Wildlife, Washington State Department of Transportation, US Environmental Protection Agency, and the US Army Corps of Engineers.

Darla Inglis (206) 233-7160

University of Washington Center for Water and Watershed Studies

Seattle Public Utilities is a participant on the Advisory Panel for the Center for Water and Watershed Studies. Due to reduced staff availability, SPU had limited involvement with the Center in 2003 and early 2004. However, SPU continues to provide financial contribution to the Center to support drainage-related issues. The mission the group is to conduct research, education, and information transfer the broader umbrella of regional watershed studies and encompassing diverse aquatic and human environments. The CWWS is a source of comprehensive aquatic resources and water management information to maintain and enhance the earth's watersheds. The research of the Center provides models for addressing both regional and global watershed issues, bringing together science and policy studies for publication and for discussion in courses, seminars, and workshops. CWWS is a broad, collaborative community of environmental scholars, achieving its goals through research, education, and information transfer.

Darla Inglis (206) 233-7160

Local Hazardous Waste Management Program

SPU participates as one of five partners in implementing the regional Local Hazardous Waste Management Program in King County, in existence since 1991. This interagency partnership oversees the management of a long-term plan to reduce the use of and manage disposal of hazardous waste and consists of SPU, the Water and Land Resources and Solid Waste divisions of King County's Department of Natural Resources, the Public Health Department of Seattle and King County, and the Suburban Cities Association. SPU provides staffing to coordinate HHW education and collection programs as part of the LHWMP, to represent SPU on interagency committees and workgroups, and to help develop strategic policy, planning and budget proposals in support of SPU and LHWMP goals. Results for 2003 and the first half of 2004 include:

- MCC approved continued LHWMP funding for EJNA and integration with other LHWMP programs
- MCC approved continuation of Green Gardening and Natural Yardcare programs, while cutting other HHW Ed programs in the county
- Leveraged resources from Watershed Steward program in developing and implementing Natural Yardcare Neighborhood workshop series in Fauntleroy and Thornton Creeks.
- Provided funding for Haz Shed customer survey and for annual LHWMP report

Kathy Minsch (206) 615-1441

Watershed Resource Inventory Area (WRIA) Coordination

The City of Seattle continues to be actively involved in Watershed Resource Inventory Area (WRIA) planning. The jurisdiction of the city of Seattle is contained in WRIA 8 (Cedar/Lake Washington) and WRIA 9 (Green/Duwamish). Owing to municipal operations in other areas outside the city's limits, Seattle is also active in WRIA 7 (Tolt/Snohomish), WRIs 3 & 4 (Lower & Upper Skagit), and WRIA 62 (Pend Orielle). SPU has two full-time, senior-level WRIA

coordinators (WRIA 8 & 9), and Seattle City Light has allocated staff to WRIAs 3/4, 7 and 62. WRIA planning efforts work to build inter-jurisdictional coalitions and partnerships that integrate citywide efforts within each WRIA. The WRIA planning bodies have focused planning agendas on developing baseline salmon habitat assessments and recovery plans, which have included identifying watershed-wide informational needs and limiting factors to salmon recovery. In February 2002, WRIA 8 produced a Draft Near-Term Action Agenda for Salmon Habitat Conservation and in May 2002, WRIA 9 issued its final Near-Term Action Agenda for Salmon Habitat Conservation. WRIA 7 produced a Near-Term Action Agenda in December 2001. These documents are the product of over a year of collaborative discussions among elected officials, jurisdictional staff, business and environmental groups, scientists, and concerned citizens. They are intended to provide guidance to local governments and interested organizations and citizens on interim measures that can be undertaken in the near-term while longer-term conservation plans are being developed.

WRIAs 7, 8 and 9 have completed their strategic assessments, which are providing a scientific basis for developing salmon recovery actions. WRIA 8 used an ecosystem model, Ecosystem Diagnosis and Treatment (EDT) to assess historic and current habitat conditions in the Lake Washington basin. Modeling results were used in conjunction with Chinook salmon distribution and an analysis of current land use patterns in the basin to develop a set of recommendations for site specific habitat protection and restoration projects. WRIA 8 will continue using EDT in 2005 to evaluate the relative benefits of different suites of actions for recovery of Chinook runs. WRIA 9 has completed assessing both current and historic habitat conditions to provide insight for developing their salmon recovery projects. Close coordination with the Puget Sound Nearshore Ecosystem Restoration Project has allowed the WRIA to place emphasis on marine nearshore habitats, in addition to the freshwater ecosystem. WRIA 3/4 revised its strategic plan for prioritizing recovery projects to emphasize ESA listed species: chinook salmon and bull trout. Recovery efforts in the Skagit watershed are currently focusing on estuary and nearshore areas, with a number of cooperative scientific studies identifying the importance of these areas to chinook salmon and bull trout. WRIA 3/4 completed an analysis of long-term restoration approaches for salmon habitat in the Skagit delta and estuary. WRIA 7 developed an Ecological Analysis for Salmonid Conservation (EASC) as a collaborative effort between its technical committee and the Puget Sound Technical Recovery Team for Chinook salmon. The EASC employed EDT and a separate model called Shiraz to categorize sub-basins for their importance to habitat and devise individual protection and recovery strategies.

WRIA 8 is in the process of developing a comprehensive habitat plan for the Lake Washington basin, including recommended site-specific habitat protection and restoration projects, land use actions and public outreach/stewardship initiatives. A draft plan has been completed and is undergoing review and refinement by the WRIA 8 planning bodies. Public review of the document is expected to begin in November 2004, and a final plan should be available by May 2005. WRIA 9 will develop recovery actions during 2004 and expects to have its habitat plan completed in mid-2005. WRIA 7 approved its Draft Snohomish River Basin Salmon Conservation Plan in July 2004, triggering a public and agency review period with final plan approval expected in June 2005.

Additional information for WRIAs 8 and 9 can be found at

<http://dnr.metrokc.gov/WRIAS>

Additional information for WRIA 7 can be found at

<http://www.co.snohomish.wa.us/publicwk/swm/salmon/snohoplan/index.htm>

Sarah McKearnan, WRIA 8 (206) 615-0567; Judith Noble, WRIA 9 (206) 684-8078; Scott Powell, WRIA 7 (206) 386-4582; Ed Connor, WRIAs 3&4 (206) 615-1128

Watershed Forums

Seattle's elected officials and staff have participated in local Watershed Forums since their inception several years ago. These Forums were initially formed as an outgrowth of the Regional Needs Assessment for surface water management, and were originally tasked to address surface water management needs, including flooding and water quality. The Forums were later expanded to also address salmon and related habitat issues, and in 2001 they were formally aligned with the WRIA planning processes. The purpose of these Forums is to:

- Provide an opportunity for all local governments that share the watershed to discuss salmon habitat and water quality issues;
- Provide overall direction for joint efforts to recover salmon habitat;
- Allocate King Conservation District funds to salmon habitat projects and activities important to the entire WRIA; and
- Provide oversight for the jointly funded staff working on salmon habitat planning.

The boundaries of Seattle lie within the Lake Washington/Cedar/Sammamish Forum (WRIA 8) and the Green/Duwamish and Central Puget Sound Watershed Forum (WRIA 9). [Note that in 2001, the Central Puget Sound Subforum was incorporated into the Green/Duwamish Forum.] Interlocal agreements have been signed through which all jurisdictions are financially supporting the WRIA planning process. King Conservation District funds, allocated through the Forums, support projects for salmon recovery, in some cases supplying the local match for Salmon Recover Funding (SRF) Board grants.

Sarah McKearnan, WRIA 8 (206) 615-0567; Judith Noble, WRIA 9 (206) 684-8078

Lower Duwamish River Sediment Cleanup and Restoration

The City is preparing a Remedial Investigation of the Lower Duwamish in partnership with King County, the Port of Seattle, and Boeing. This work is being done under an Administrative Order on Consent (AOC) from EPA and Ecology under the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund) and the Washington State Model Toxics Control Act (MTCA). Phase I of the Remedial Investigation (RI) has been completed, resulting in the identification of eight candidate sites for early cleanup action. The Phase II RI and Feasibility Study are scheduled to conclude in 2007, followed by a Record of Decision in 2008. Two Early Action Areas are expected to undergo cleanup in 2006. SPU is also a member of the multi-jurisdictional Elliott Bay/Duwamish Restoration Panel (EBDRP), which was created as a result of a consent order settling Natural Resource Damages claims. EBDRP includes representatives from NOAA, US Fish and Wildlife, the Muckleshoot and Suquamish tribes, the Department of Ecology, King County and the City of Seattle. It prioritizes and funds clean up and restoration projects on the Duwamish River using City and County funds contributed as part of the settlement. It has funded a clean-up project at the Norfolk site, removing 5500 cubic yards of contaminated sediment for disposal. Habitat projects include habitat restoration at the Seaboard Lumber site and other locations. The Diagonal/Duwamish

clean up will begin early 2004 and will be funded as an EBD RP project.

Martin Baker (206) 684-5984

3.3 REGULATIONS & TECHNICAL STANDARDS

3.3.1 Stormwater, Grading and Drainage Control Code and Directors' Rules

In July 2000, the City revised its Stormwater, Grading and Drainage Control Code (Seattle Municipal Code 22.800 - 22.808) and associated Directors' Rules for Flow Control, Stormwater Treatment, Source Control, and Construction Stormwater Management. Now fully in effect, the Code and Directors' Rules can be viewed on the City's Website:

<http://www.ci.seattle.wa.us/dclu/Codes/sgdcode.htm>

Beginning in early 2002, Seattle Public Utilities (SPU), working in partnership with Seattle Department of Transportation (SDOT) and the Department of Planning and Development (DPD), began identifying where changes in the City's 2000 Stormwater Code may be warranted in light of Ecology's Stormwater Management Manual for Western Washington (August 2001). The long-term goal of this project is to develop a revised set of technical standards and code requirements for stormwater flow control, treatment, construction and source control needs that account for Seattle's built-out environment and development patterns while, at the same time, addressing Ecology's revised guidelines.

This project is being conducted in conjunction with development of SPU's Comprehensive Drainage Plan. The work included completing a gap analysis that compares the City's existing Stormwater Code with the Department of Ecology's 2001 Stormwater Manual.

In January 2004, a Stormwater Code Revision Steering Committee was formed to begin the process to revise the Stormwater, Grading and Drainage Control Code (Seattle Municipal Code 22.800 - 22.808) and various related documents. The Steering Committee identified several specific topics that needed to be addressed and the technical staff that would revise the code associated with each topic. The following eight teams were then formed:

1. Flow Control: Creek Discharge
2. Flow Control: Storm Drain Discharge
3. Flow Control: Combined Sewer System Discharge
4. On-Site Flow Control
5. Water Quality: Source Control
6. Water Quality: Treatment Requirements
7. Integrated Drainage Plan
8. Enforcement

After each team started completing the "Scope of Work" process for revising the code, it was identified that a ninth team, called the Revenue/Financial team, needed to be established to assist with the overall revision process. This team would evaluate financial ramifications associated with each team's proposed code.

In late August 2004, each team completed a Business Case or work plan that outlines the process for completing the revised code. Currently, each team is in process of completing the first of seven tasks laid-out within their team's Business Case.

As part of the code revision process, the City of Seattle has invited other NPDES communities to partner with us. This partnering effort would allow resources to be shared between participating agencies to complete similar code revisions. Nine agencies have shown an interest to partner and attended a joint meeting in August. A second meeting is scheduled for late September to discuss the specific topics that have the potential for such partnering. The following agencies are interested in the partnering effort: City of Tacoma, City of Shoreline, City of Kirkland, City of Bellingham, City of Bellevue, Snohomish County, Pierce County, King County, and the Puget Sound Action Team.

Rick Johnson (206) 233-7861

3.3.2 Side Sewer Code

Seattle Municipal Code 21.16, the Side Sewer Code, prohibits certain discharges into the City's public sewer system, drain, ditch, or natural outlet. Included in the list of prohibited discharges are: fats, oils, grease, high temperature liquids, flammables and oils, toxic and poisonous substances, garbage, sand, and mud.

In February 2003, the Department of Planning and Development (DPD) began issuing side sewer permits and providing side sewer inspection. Previously Seattle Department of Transportation was providing the permitting and inspection. The transfer of work included the upgrading of the requirements for the Registered Side Sewer Contractor (RSSC) who are permitted to do side sewer construction work in the Public Place (Seattle right-of-way), providing a tracking system for issuance of permits (i.e. detention, infiltration, water quality, etc.), and creating information material for the general public including a side sewer web page portal (<http://www.cityofseattle.net/dpd/SideSewer/default.asp>).

Two new code revisions are being processed with the City including updating the side sewer fees and requirements for the RSSC. Side sewer permit fees have not been updated since 1998. Likewise, the requirements for the RSSC require revision because they do not reflect the current requirements such as bonding amounts and insurance requirements. Both code revisions are planned to become effective January 2005.

Gary Schimek (206) 615-0519

3.4 PERMITTING, INSPECTIONS & ENFORCEMENT

3.4.1 Drainage Plans and Permit Approval

Development permits are issued by the City of Seattle's Department of Planning and Development (DPD). In 1999 the Department, then known as DCLU, conducted an internal reorganization, combining the teams that conducted Drainage and Environmentally Critical Area project review with teams that conducted On-Site Inspections. This reorganized group within DPD was called the *Site Development* (SD) team. The intent was to bring all the necessary skills associated with site development into one team to perform a comprehensive project review and inspection.

In 2000, the Department initiated a new program that required Pre-application Site Visit (PASV) inspections for all proposed construction projects (prior to an applicant's submittal of development plans) where the existing ground condition or vegetation will be disturbed. These

PASVs are generally done within 48 hours of DPD receiving a PASV and Addressing Application. These site visits are designed to verify actual on-site conditions, including: topography, soils, environmental impacts, specific concerns, and the types of special reports needed (topographic survey, wetlands, etc). The SD team also assists land use and code enforcement staff with site issues, and provides site review for short plats, Master Use Permits, complaints and violations.

In February 2003, the SD team expanded its services by incorporating the Side Sewer function. This consolidated the drainage review with side sewer permitting (that included drainage permits) and inspections as it relates to site development under one office and to help improve control of soil erosions as a result of construction activities. Previously side sewer permitting and inspection was conducted by the Seattle Department of Transportation (SDOT). As part of this work being transferred from SDOT to the DPD's SD team, Hansen software was developed for side sewer permitting and inspection. This software provides a comprehensive permit tracking system to evaluate a project's square footage of impervious surface.

DPD's SDS office currently consists of 20 staff members: a supervisor, a senior civil engineer, an associate civil engineer, three senior civil engineering specialists, eight senior site inspectors, three geo-technical engineers, and an environmental biologist. Special concerns of the SD team is site construction activity that occurs within ECAs, shorelines and within the drainage basins of the City's five major creeks. The Drainage and Sewer Desk of DPD is staffed by SD senior civil engineering specialists to provide technical advice and review on grading, side sewer and drainage components of construction projects.

Ken Watanabe (206) 233-7912

3.4.2 Water Quality Complaints

SPU surface water quality inspectors respond to water quality-related complaints within the City limits. The complaints originate from citizens who call the City's hotline (684-7587), staff reports, and referrals from other departments and agencies. When the team responds to a complaint, every attempt is made to stop the polluting action, determine the responsible party and coordinate clean up, if possible. Inspectors provide technical assistance on best management practices for pollution prevention and education on relevant Seattle codes. All complainants, if requested, are notified of investigation results. When necessary, the team pursues enforcement actions against the responsible party.

SPU water quality inspectors received 305 surface water quality complaints in 2003 and 169 between January 1 and June 30, 2004. A summary of the water quality complaints received during 2003 and the first 6 months of 2004 are provided in Table 1.

Table 1. Summary of Water Quality Complaints

Type of Action	January 1 to December 31, 2003	January 1 to June 30, 2004
Water Quality Complaints	305	169
Resolved	216	117
Unresolved	89	52

In 2003, the most frequent water quality complaint involved discharges of chemicals (52%), which includes automotive fluids, oil, paint and other unknown chemicals. This was followed by

the category 'other' (38%), which includes turbid water, grease and other miscellaneous discharges. Debris (construction, commercial and residential) accounted for 5% of the complaints, as did reports of sewage (5%). These trends continue for 2004 (chemicals 49%, other 39%, debris 7%, sewage 4%).

Cases are classified in the database as unresolved or resolved. In 2003, 216 cases were resolved, while 89 cases remained unresolved. A case is considered resolved if education and technical assistance are provided to the alleged violator(s) and/or the case is referred to an appropriate department or agency. The case is considered unresolved if the problem cannot be found or confirmed by SPU inspectors or if the original source cannot be identified. There is currently about 1 FTE assigned to this program.

Ellen Stewart (206) 615-0023

3.4.3 Business Inspection Program

The goal of the Business Inspection Program is to reduce stormwater pollution by inspecting and requiring businesses to implement best management practices in accordance with the City's Stormwater, Grading and Drainage Control Code. All businesses are required to maintain onsite drainage control systems and identify and remove illicit connections to the public storm drain system. Inspectors use a list of HRPGA (high-risk pollution generating activities) to assist in determining businesses that require additional operational source control requirements. All businesses that engage in one or more HRPGA's are required to implement operational source controls and implement spill prevention plans. A list of the HRPGA's and their specific operational requirements are listed in Table 2.

In 2003, inspections were conducted in the Thornton and Lower Duwamish (Superfund) drainage basins. There were a total of 356 full onsite inspections. Of those, roughly 200 required corrective action. In addition, there were 83 screening inspections done. During screening inspections, inspectors survey site activities but determine a full inspection is not necessary. The most common problems found during business inspections include catch basins full of sediment and incomplete and/or missing spill prevention plans and spill kits.

For the period January - June 30, 2004, 217 full business inspections and 114 screening inspections were conducted. The inspection areas included the Thornton, South Park and Duwamish basins.

Approximately 10 illicit connections were identified and corrected during the inspection period of January 2003-June 2004.

An Access database has been developed to aid in tracking of the business inspection program progress. There are currently about 3 FTEs assigned to business inspections. An additional inspector was hired in 2004 to help with Lower Duwamish Superfund inspections.

Table 2. High Risk Pollution Generating Activities

High Risk Pollution Generating Activity	Operational Requirements
Fueling Operations	Develop and implement an emergency spill prevention plan. Post instructions for safe operation of dispensing equipment. Ensure that spills are reported to proper authorities.
Vehicle, Equipment, and Building Washing and Cleaning Operations	Wash vehicles at a commercial facility designed to capture and properly discharge wash water. No discharge of wash water to storm drain system.
Truck or Rail Loading and Unloading of Liquid and Solid Materials	Develop written procedures for transfer operations. Develop and implement an emergency spill prevention plan. Have a trained employee present during fueling operations. Equip pumps with shutoff valves and label as such. Store and maintain spill containment materials.
Liquid Storage in Aboveground Stationary Tanks	Check fittings daily for leaks and spills. Maintain containment system. Store and maintain spill containment materials.
Outside Portable Container Storage of Liquids, Food Wastes, or Dangerous Wastes	Store materials inside proper containers. Dispose of waste regularly and properly. Check for leaks and spills regularly. Have spill prevention and clean up materials on site.
Outside Storage of Non-containerized Materials, By-products or finished products	Cover storage area to prevent contact with rainwater. Sweep paved areas. Temporarily cover storm drains to prevent erodable material from entering.
Outside Manufacturing Activity	Isolate activity and cover to avoid contact with rainwater. Regularly sweep and maintain areas. Have spill prevention and clean up materials on site.
Landscape Construction and Maintenance	Comply with applicable temporary erosion and sediment controls. Properly apply pesticides and fertilizers. Properly dispose of leaves, grass clippings, etc.

Ellen Stewart (206) 615-0023

3.4.4 Drainage System Inspection Program

In 2003, 319 drainage system inspections were completed, and 149 inspections have been completed during the first 6 months of 2004. A summary of the types of facilities inspected in 2003 is presented in Table 3.

Of the 319 sites inspected in 2003 98 were out of compliance with City Code and in need of some level of maintenance or repair. Technical assistance is provided to property owners when they are informed of maintenance deficiencies. Removal of sediment from flow control structures and/or onsite catch basins, was the most common maintenance need. Other common compliance issues include catch basins missing outlet traps, and missing, broken, or plugged flow control devices. Through the Drainage System Inspection Program, 3 illicit connections were identified and corrected in 2003.

Table 3. Types of Drainage Facilities Inspected in 2002

Facility Type	2003
Apartment/Condo/Townhome	146
Church	6
Commercial	152
Parking Lot	6
Public Facility (Parks, City Light)	6
School	3

Inspections focus primarily on multi-family dwellings, commercial, and industrial properties. A second full canvass of the City is nearly complete. After the second round of city-wide drainage system inspections is complete, the team hopes to develop an inspection frequency guideline for different types of sites. For instance, many residential sites did not need to be cleaned when re-visited after 3 years. Such sites could be put on a 5-6 year inspection frequency, freeing time for other more effective pollution control activities. A new database is currently being developed that will integrate both the business inspection and drainage system inspection programs. The total number of privately owned systems in Seattle is estimated to be 3,250 (+/- 200).

Ellen Stewart (206) 615-0023, Louise Kulzer (206) 733-9162

3.4.5 Pollution Prevention Direction-finding

In 2003, the Surface Water Quality team conducted a dry-season source tracing reconnaissance in the Thornton Creek basin. However, the drainage system for the Thornton Creek basin is very fragmented, making it inefficient to investigate the drainage system. There are few confluences in the drainage system other than at the Creek mouth. Thus, a large number of maintenance holes would have to be pulled independently to determine if there is flow in dry weather. In addition, groundwater seepage is commonly directed into the drainage system in the upper basin, so the maintenance holes would also have to be sampled for fecal coliform to distinguish groundwater from flows due to illicit connections. We also attempted to walk the stream from the mouth, but frequent piped sections, dangerous steep banks and vagrant trespass made progress slow and difficult. We concluded that walking the channel and observing flow inputs would not be feasible, and the effort was tabled for 2003.

In 2004, a pilot source control effort has begun in the Piper's Creek watershed. The purpose of the effort is to determine the source of sewage and petroleum odors in the Piper's Creek ravine. That effort is underway and will be reported on next year's report. Lack of flow has been observed, indicating a lack of illicit connections. To date, it does not appear that high levels of fecal coliform in Piper's Creek are from illicit connections. In the past, animal and pet waste has proven to be the source of most fecal coliform pollution in the Piper's Creek watershed.

Louise Kulzer (206) 733-9162

3.4.6 Lower Duwamish Waterway Source Control Program

In 2003, Seattle and King County initiated a joint business inspection program to support the Lower Duwamish Waterway source control program. The Lower Duwamish Waterway (LDW) was listed as a federal Superfund site in 2001 because of contaminated waterway sediments. SPU and King County are working with businesses in the area to reduce the amount of pollutants currently discharged to the waterway via storm drains and combined sewer overflows

(CSOs). The purpose of the source control program is to minimize the potential for sediments to recontaminate following cleanup. The inspection efforts are focusing on areas that have been identified as high priorities for cleanup based on the results of human health and ecological risk assessments. Inspections are comprehensive, covering stormwater pollution prevention, hazardous waste management, and industrial waste disposal issues.

The inspection program began in March 2003 in the Diagonal Ave S CSO/SD basin, a 2,600-acre drainage basin that also receives overflows from both the King County interceptor and the local SPU wastewater system. Inspectors from SPU, King County Hazardous Waste, King County Industrial Waste, and King County Public Health completed 498 inspections in 2003 (366 full inspections and 132 screening inspections) and 312 inspections during the first six months of 2004 (183 full and 129 screening). SPU inspectors were responsible for 172 of the 498 inspections completed in 2003 and 134 of the 312 inspections completed as of June 2004.

The King County/SPU joint business inspection program in the LDW is expected to continue through the next NPDES reporting period. Inspectors moved into the Slip 4 early action area in July 2004 and are expected to expand to other early action sites in 2005.

Beth Schmoyer (206) 386-1199 & Tanya Treat (206) 615-1636.

3.5 STORMWATER POLLUTION PREVENTION

3.5.1 Household Hazardous Waste Program

The Household Hazardous Waste (HHW) Education program is a multi-faceted approach to educating the public, including the under-served community, about the proper use, storage and disposal of hazardous household products and about the availability of less toxic alternatives.

Kathy Minsch (206) 615-1441

Green Home Kit Program

This program produces and distributes Green Cleaning Kits and Green Cleaning information primarily in the form of Green Cleaning Recipe Cards. The program also conducts New Parent Workshops that use these kits to help established parent training groups that learn about a broad range of hazardous household chemicals and healthful alternatives to these chemicals. In addition the Green Home Kits have been used as outreach tools at community festivals and by community-based organizations serving recent immigrant and refugee populations. In most cases, recipients of the kits are directed to use them as a means to begin an educational process about hazardous household chemicals that encompasses the more dangerous groups of cleaners.

Among the accomplishments for 2003:

- Adopted a new program approach in 2003, based on the recommendations of an interagency subcommittee of the Local Hazardous Waste Management Program. The purpose is to better educate consumers about how to choose safer cleaners.
- The recipe card was replaced with a resource card that gives tips on safer cleaners and cleaning approaches. Changes to the kit include elimination of baking soda and vinegar from the kit and replacing them with Bon Ami and one of seven all purpose cleaners.

This card was translated into Spanish, Chinese (Mandarin), Vietnamese, Cambodian, & Amharic for outreach into recent immigrant and refugee populations.

- Distributed 1500 Kits
- Partnered with community-based organizations who gave trainings, focus groups, and festival outreach in the following languages: English, Tagalog, Chinese (several dialects), Vietnamese, Somali, Oromo, and Amharic.

For January through August 2004:

- Reprinted the recipe card due to high demand among community-based organizations doing outreach with the Green Home Kit. This card was available in English, Spanish, Chinese, Vietnamese, and Cambodian.
- Sponges were replaced with reusable diaper rags to promote waste reduction and reusing materials.
- A survey is accompanying supplies given to community-based organizations and other partners distributing Green Home Kits.
- Distributed 700 Kits.

Continued building partnerships with community-based organizations doing outreach in recent immigrant and refugee communities. Created new relationships with the Khmer Community of Seattle/King County, enabling outreach with Khmer/Cambodian populations.

Michael Davis (206) 615-1376

The Eco-Home

The Eco Home is a collaboration between Seattle Public Utilities, Seattle City Light, Seattle Tilth, the International District Housing Alliance (IDHA), King County Public Health, and King County DNR. The purpose of this exhibit is to educate festival attendees using hands on activities showing what they can do in their home, yard, garden and community to protect the health of their family and the environment and save money. Agency staff and trained community volunteers were on hand to engage the public and answer questions. Among the accomplishments in 2003:

- Eco Home display at two community events: International District Street Fair and White Center Jubilee Days.
- With the help of IDHA staff and community volunteers who spoke Chinese, Vietnamese, Tagalog, Thai, Somali, Amharic, Oromo, Spanish and Cambodian, we were able to dramatically increase our outreach efforts with non/limited English speaking festival attendees.
- Volunteers at the ID Street Fair were multi-lingual youth engaged in IDHA's Wilderness and Inner-city Leadership Development (WILD) program. Funded in part by the Seattle Young People's Project, the WILD youth were given training on the Eco-Home display before the event so that they were able to communicate with community members who were non/limited-English speakers.

- WC Jubilee Days included volunteers from the Pasefika Samoan youth summer program, the Asian Pacific-Islander Women & Family Safety Center, and the Environmental Coalition of South Seattle.

Among the accomplishments during the first half of 2004:

- Eco Home display at two community events: International District Street Fair and White Center Jubilee Days.
- Additional outreach display provided by the U.S. Forestry Department that featured information on recreational activities and salmon conservation. This partnership was made possible by contacts at IDHA.
- Seattle Public Utilities' Recyclettes provided information on the new recycling program and had information available in English, Chinese, Spanish, Vietnamese, and Cambodian.
- WILD youth volunteers continued to be a valuable resource for outreach and translation at this year's festival.
- In addition to continued volunteer partnerships at WC Jubilee Days, the Khmer Community of Seattle/King County provided translation skills and outreach.

Michael Davis (206) 615-1376

3.5.2 Storm Drain Stenciling

The purpose of SPU's Storm Drain Stenciling Program is to educate the general public about pollution prevention and reduce pollution in the storm system. SPU provides storm drain stenciling and oil spill kits for community and business volunteers. Among the accomplishments in 2003 and the first half of 2004:

- Increased the number of storm drains stenciled by school participants to 1,502.
- Facilitated the general public stenciling 2,722 storm drains.

Carlton Stinson (206) 684-7624

3.5.3 Resource Venture

SPU contracts with the Resource Venture, a component of the Greater Seattle Chamber of Commerce, to increase business awareness and compliance with current stormwater codes. The Resource Venture provides free information, education and technical assistance to help Seattle businesses improve all conservation practices. Their stormwater assistance, provided by ECOSS (The Environmental Coalition of South Seattle) focuses on providing site-specific assistance for businesses needing non-standard approaches to pollution prevention. The Resource Venture and ECOSS reach businesses through newsletters, trade publications, community presentations, workshops and phone and web resources. In 2003, ECOSS joined in a community-wide Lake Union Cleanup promotion organized in part by the Puget Sound Keepers. Taking advantage of the awareness from the clean-up publicity, ECOSS conducted site visits for businesses surrounding the Lake, educating them about where their drainage

goes and advising them on the implementation of best management practices. A mailing was also done to informing businesses within the South Lake Union drainage area that their storm drains discharge directly into the lake without treatment. This awareness-raising activity was particularly important because much of the drainage area is on Capitol Hill, an area fairly remote from Lake Union and with little awareness of their impact on the lake.

Louise Kulzer (206) 733-9162

3.5.4 Hazardous Material Inventory

During 2001 through 2003, SPU conducted annual inventories of hazardous materials used at SPU facilities. These inventories formed the basis for better management of hazardous materials stocks on hand and for the elimination of unused, outdated, or surplus chemicals that otherwise could end up in the environment (see below). The 2001 and 2002 inventories were entered into a database and the information made available on the City's internal web site. The 2003 inventory is complete, but is not yet in the database. Due to organizational and staffing changes, the centralized hazardous materials inventory was not conducted in 2004. SPU is currently re-assessing the Hazard Communication business process and considering business process redesigns related to hazardous materials selection, procurement, storage, inventory, MSDS management and employee training. The goal of the business process re-design is to ultimately reduce the number of hazardous chemicals used by SPU operations.

Shab Zand (206) 233-5172

3.5.5 Hazardous Material Reduction

SPU continually facilitates the roundup and exchange of excess hazardous products from SPU shops and facilities. This waste reduction strategy along with improved facility practices and green purchasing has resulted in great savings in disposal costs (these products if not used-up would become hazardous wastes), reduced new product purchase costs, improved facility compliance and decreased regulatory scrutiny. These products are first offered to various City Departments for re-use, and later offered to other users through the King County Local Hazardous Waste Management Program's Industrial Materials Exchange (IMEX).

Shab Zand (206) 233-5172

3.5.6 Natural Lawn and Garden Care Campaign/Natural Soil Building

In 2003 and the first half of 2004, the Natural Lawn and Garden Care Campaign continued with distribution of the "Naturals" brochures to nurseries and community events throughout King County. Approximately 40,000 brochures were distributed to area nurseries, the Northwest Flower & Garden Show, and other event and organizational requests. In 2003 and the first half of 2004, there were over 4,500 pesticide reduction-related questions answered by Hotline staff. Overall, the Hotline answered over 15,000 questions related to environment-friendly yard care. About 1,300 people participated in workshops, meetings and speaking engagements on natural yard care during this time period.

SPU continued participating in Northwest Natural Yard Days with other regional agencies. The program expanded to a truly regional focus, encompassing box stores from Bellingham to Olympia plus smaller independent stores in the King County area. The program continued selling a broad range of environmentally-sound products including electric mulching mowers, push mowers, organic fertilizer, insecticidal soap (alternative to pesticide), hand weeding tools, water timers, soaker hoses and compost. In 2004, the program transitioned to a seasonal

format, with sales in both April-May and September. In the Seattle/King County/Tacoma area, over 161,000 products were sold during the spring of 2003 and 2004.

The Natural Soil Building Program sold over 3,600 food waste composters and over 1,200 yard waste composters to Seattle residents. The Chip and Mulch Tour Pilot Program of decentralized wood chipping services was discontinued due to the high cost per diverted ton of woody waste. The Industry Soils Collaboration sponsored a spring seminar at the Center for Urban Horticulture on "Stormwater: Turning a Potential Problem into an Asset". The seminar filled quickly with over 90 professional attendees, and a waiting list of 50 people was set up. The seminar will be re-designed and repeated in January 2005.

In the first half of 2004, SPU repeated the Natural Yard Care Neighborhood outreach in two new neighborhoods. The response was once again very positive. A series of six classes over three evenings was presented in each neighborhood. As part of this effort, 86 residents attended one or more evenings. Door prizes were awarded, and participants gave very high ratings to all the workshop presenters. Evaluations conducted in Fall 2003 indicated a high degree of attitude and behavior change.

Carl Woestwin (206) 684-4684

3.5.7 Green Gardening Program

From 1993 through 2003, the Green Gardening Program was implemented by the consultant team of Seattle Tilth Association, Washington Toxics Coalition and Washington State University Cooperative Extension. In 2004, the contract was awarded to Cascadia Consulting Group. The program has been managed by SPU and funded by the Local Hazardous Waste Management Program (LHWMP) since 1993, with the goal of educating King County residents and landscape professionals about alternative pest management strategies in an effort to reduce pesticide use. Among the accomplishments from 2003 through June 2004:

- Special emphasis was placed on weed and feed products, and the problems they pose were discussed with all program audiences, both professional and residential.
- 58 general audience presentations were made to gardening and community groups, reaching an audience of 1158 people. More than half of those who use weed and feed said that they would quit or consider quitting after hearing the presentation.
- In 2003, Mary Robson wrote a total of six Green Gardening articles for the Practical Gardener column in the *Seattle Times*. Beginning in May 2004, Ann Lovejoy wrote four Green Gardening articles for the *Seattle Post-Intelligencer*.
- 92 Master Gardeners plus 18 staff and other volunteers received a three-hour introduction to Green Gardening principles during their training period.
- Two new *ProlPM* fact sheets were written in 2003, bringing the series total to 26. The *ProlPM* fact sheets were promoted in nine print ads that ran in the journals of the Washington Association of Landscape Professionals and the Washington State Nursery and Landscape Association. Internet access to the *ProlPM* fact sheets increased more than 20% over 2002 levels.
- The Green Gardening team developed new curriculum and presented two cycles of ten workshops for staff at garden centers and the SPU Natural Lawn and Garden Hotline. Spring attendance was 139; fall attendance was 123. In spring of 2004, 147 nursery

staff from eight nurseries attended workshops. Eighty-two percent of participants said that they try to steer customers away from weed and feed products towards other methods of weed control.

- In cooperation with instructors, a new, expanded curriculum was developed for the community college horticulture classes. Each group received 4.5 contact hours of teaching, and students were required to do a class project. This new curriculum was presented to students at Edmonds Community College, South Seattle Community College, and two classes at Lake Washington Technical College.
- The one-day IPM conference for landscape professionals attracted the highest registration ever: 372.
- All aspects of the Green Gardening Program were evaluated with participant surveys. New questionnaires this year explored consumer use of and attitudes towards weed and feed, as well as retailer perspectives on the issue.

Carl Woestwin (206) 684-4684

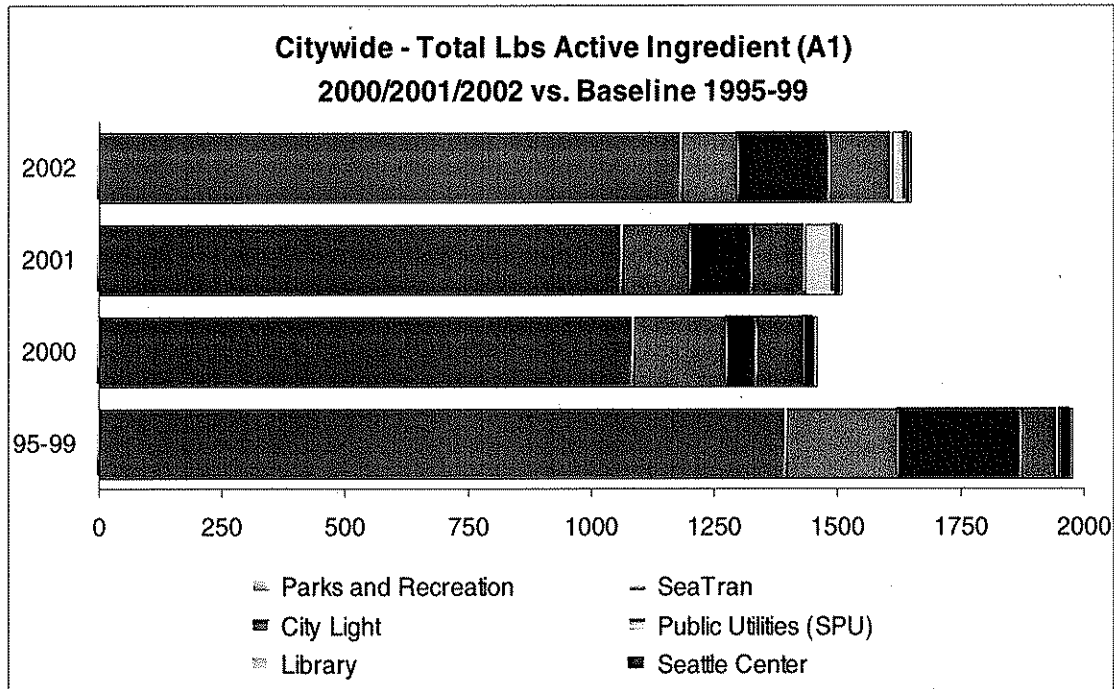
3.5.8 Pesticide Reduction

Seattle's Pesticide Reduction Program is an outgrowth of the Seattle Environmental Management Program (EMP), which was adopted to promote environmental stewardship in City operations. The EMP Chemical Use Policy establishes a framework for evaluating potentially hazardous materials and prioritizing products for phase out and replacement with less hazardous alternatives. Pesticides were the first product group addressed under the policy because they are potentially hazardous chemicals intentionally placed directly into the environment. The two main goals of the Pesticide Reduction Program are (1) to eliminate the use of the most potentially hazardous herbicides and insecticides and (2) to achieve a 30 percent reduction in overall pesticide use. Employee-driven innovations have resulted eliminating use of most Tier 1 insecticides and herbicides and significantly reducing overall pesticide use. **Error! Reference source not found.** is provided below for information on the progress of the program. The chart shows the estimated reduction in pesticide use for 2000 - 2002 against a baseline developed using average annual pesticide use between 1995-1999. Data for 2003 is not available.

The focus of the pesticide reduction program for 2003 and 2004 is golf course pesticide use. Golf courses pose unique challenges as they are relatively artificial environments and therefore particularly susceptible to disease. Seattle Parks is working to reduce pesticide use while maintaining playability by replacing products with those with lower concentrations of active ingredients, more targeted pesticide applications, and enhanced cultural practices to improve turf health and disease resistance. Early results are promising.

Additional information on Seattle's Pesticide Reduction Program is available at:

<http://seattle.gov/environment/pesticides.htm>



Total Pounds Active Ingredient (A1), 2000/2001/2002 vs. Baseline Avg. (1995-1999)

Figure 2. Citywide Pesticide Use

Tracy Morgenstern (206) 386-4595

3.5.9 Pesticide Free Parks

In 2001, Seattle Parks and Recreation and the Office of Sustainability and Environment designated fourteen Seattle park locations as Pesticide-Free Parks (PFPs). These locations have been maintained without the use of pesticides, providing City staff with the opportunity to better understand options for caring for lands with less reliance on pesticides *and* providing the community the opportunity to enjoy parks managed without pesticides. In 2004, Seattle Parks is expanding this program to provide a greater geographic distribution of Pesticide-free Parks throughout the City. It is anticipated that the total number of PFPs will be 20 to 25 with the addition of new sites, which will come online in early 2005. Additional information is available at <http://seattle.gov/environment/pesticides.htm>.

Barb Decaro (206) 615-1660 or Tracy Morgenstern (206) 386-4595

3.6 PUBLIC INVOLVEMENT, EDUCATION, STEWARDSHIP.

Pollution prevention activities conducted by SPU include public involvement, education, and stewardship programs described below.

3.6.1 Citizen Advisory Committee

Seattle Public Utilities sponsors several Citizen Advisory Committees. The advisory committee most involved with stormwater-related issues is the Creeks, Drainage and Wastewater Advisory Committee (CDWAC). This committee sets its own work plan and operating procedures with input from staff. Decision-makers within SPU are regularly briefed on committee actions and input, and emphasis is placed department-wide on responding promptly to committee

recommendations. The membership of this committee includes citizens with professional background in the subject area and representatives of relevant stakeholder groups to provide a diversity of viewpoints. This committee meets on the second Wednesday of each month.

Carlton Stinson (206) 684-7624

3.6.2 Environmental Education Team

The Environmental Education Team works with both public and private partners to provide an integrated program providing a range of environmental messages encompassing solid waste, hazardous waste, recycling, water quality/drainage, and water conservation. SPU supports students through curriculum assistance and field trips that connect students with the environment outside the classroom. Among the Team's accomplishments during 2003 and early 2004:

- Partnered with the Seattle School District to provide integrated environmental programs for 2nd, 4th and 5th grade groups.
- Contracted with YMCA Earth Service Corps to provide environmental education services and support to Seattle high schools.
- Provided Salmon in School water quality program resources to private schools.
- Provided staffing and funds for teacher training to integrate SPU messages in classroom presentation and academic curriculum.
- Provided storm drain stenciling materials and services to Seattle public and private school groups.
- Provided Cedar River Watershed field trips on water quality and conservation to Seattle School groups.

Anthony Matlock (206) 386-9746

3.6.3 Salmon in the Schools

The Salmon in the Schools program gives students hands-on activities and field trips to enhance current environmental curriculum taught by Seattle teachers. Raising salmon in the classroom helps students become interested and involved in their watershed and provides an opportunity to learn what they can do to protect the environment. Among the accomplishments in 2003:

- Program completed its 13th year.
- 78 Seattle schools participate in the program.
- Program serves 4th and 5th grades, with links to the Seattle School District's academic programs.
- Program touches about 30,000 students, some directly and some by tank observation, as the tanks are placed in common areas in each school.
- Students plant over 20,000 salmon fry into local streams.

Carlton Stinson (206) 684-7624

3.6.4 Environmental Grant Funding

The Environmental Grant program provides funding support for community groups or schools to do one-time, short-term projects that protect, educate and involve communities in educating and protecting our natural resources with respect to water quality, solid waste, and litter and graffiti. During 2003, SPU funded three different levels of projects related to water quality. SPU partnered with Seattle Public Schools for \$75,000 to provide every fifth grade student (3000) science kits and field trips to teach students about water quality. The program uses a salmon-rearing aquariums curriculum prepared by science resource teachers from the district. Each class visits a local urban watershed to apply and observe the effects of urban sprawl in their environment. The focus is erosion, non-point pollution, and habitat restoration. The project included funding to train all fifth grade teachers in water quality messages. SPU also provided a grant of \$10,961 to support education at city peapatches to increase use of organic gardening methods and reduce pesticide use and \$5,000 to provide for drought tolerant plants at Beer Sheva park near Lake Washington. Metro-Center YMCA was granted \$16,000 to support Earth Service Corps clubs in each of the city's ten high schools. Projects included creek work parties and natural landscaping on school grounds. Grants were also provided to support projects that include: a boating guide for keeping waters clean of waste, erosion control training for creekside residents in the City and restoration of the Duwamish Greenbelt.

Anthony Matlock (206) 386-9746

3.6.5 Urban Creeks and Watershed Stewardship Team

The goal of leading the Watershed Community Stewardship Team is to expand and strengthen urban creek stewardship in our five major watersheds by leveraging partnerships, coordinating internally and facilitating implementation of watershed plans and programs. Highlights from 2003 and the first six months of 2004 include:

- Partnered with Resource Conservation on Natural Yardcare Neighborhood workshop series of four classes in the Fauntleroy Watershed in 2003, with detailed evaluations and surveys showing very positive response in adopting new practices. A similar series was held for lower Thornton Creek watershed residents in the spring of 2004.
- Natural Resource Stewardship Network and King County's Waterworks programs award several grants each year to community groups for watershed restoration projects in Seattle urban creek watersheds.
- Worked to include watershed education and stewardship programs in SPU's proposed Comprehensive Drainage Plan.
- Conducted 2nd and 3rd annual trainings on managing community watershed stewardship projects for WSU Cooperative Extension's Watershed Steward Class. These volunteers, many of whom live in Seattle, then commit 100 hours of their time for watershed-related education and stewardship.
- Coordinated and developed SPU comments on draft Monorail EIS regarding impacts to Longfellow Creek and provided information to LF watershed council.
- Recruited community creek leaders for first City Council workshop on creeks – five major watersheds represented on panel.
- Developed and presented power-point presentation on SPU's watershed education and stewardship programs at the AWWA conference in June 2004.

- Improved internal coordination and communication with staff and management in Resource Planning, Operations and Maintenance, Communications, and Engineering on issues involving creek stewardship.

Kathy Minsch (206) 615-1441

Creek Steward Program

The Creek Steward Program provides opportunities to learn about our creek systems and get involved in sustaining Seattle's urban creeks. Through partnerships with Seattle Parks and Recreation (SPR) and other agencies, local community groups, businesses, schools and individuals, the Creek Steward program restores riparian vegetation, maintains existing plantings, monitors creeks and salmon, and educates citizens in best management practices to benefit our urban creeks. Among the 2003 accomplishments:

- Recruited and trained 55 Site Stewards on 48 sites in five watersheds. Site Stewards provide long-term care and maintenance for established sites along Seattle creeks. Tens of yards of invasive ivy and blackberry were composted in place or removed by truck, and over 100 bags of knotweed were removed from riparian areas. In 2004, 304 volunteers have logged over 300 hours of volunteer time. Supported over 600 volunteers participating in Creek Steward invasive removal and native planting events. In 2004, conducted 26 work parties.
- Continued Backyard Steward program in 2003. Visited 22 citizen backyards (both streamside and greater watershed). Formulated standards for steward requirements in line with DCLU regulations. 14 backyard consultations have been held in 2004.
- Presented five tours of Meadowbrook Pond to students, organizations and the general public. Held two "Living With Beavers" educational and hands-on workshops.
- Continued work with business volunteer partners including Starbucks, Washington Mutual Bank, CDM Consulting, and Washington Convention and Trade Center.
- Continued volunteer macroinvertebrate monitoring with SPU monitoring staff.
- Conducted three Naturescaping workshops to teach creek-friendly gardening practices in the Taylor Creek and Thornton Creek watersheds (in partnership with Community Watershed Stewardship Staff and DPR's stewardship coordinator). 174 attendees learned about Creek Friendly Gardening techniques and salvaged native plants to be used in their new landscapes.
- Provided training in Macroinvertebrate (streambug) Monitoring – volunteers then sampled in Thornton and Pipers Creeks.
- Provided two Salmon Watcher Trainings (one large multi-jurisdictional, one for Fauntleroy Stewards) for volunteer salmon monitors.
- Creek Steward staff enabled citizens to report violations of Environmentally Critical Areas code and stopped actions harmful to the creek on at least four occasions in 2003.

Bob Spencer (206) 684-4163

Longfellow Creek Watershed Project

The Longfellow Creek Watershed Action plan guides the work of this program. The four major

goals are to: (1) improve habitat; (2) improve water quality and stormwater management; (3) increase public education and outreach; (4) improve and enhance public access. The Plan outlines recommendations and commitments made by cross-jurisdictional partners, including SPU, Parks and other City departments as well as County agencies, community groups and Neighborhood Councils. The Watershed Specialist staffs the Longfellow Creek Watershed Council and collaborates with several teams at SPU (Watershed Community Stewardship, Education, and Environmental Justice) as well as in Parks (Environmental Learning Centers) to meet overlapping objectives. The MOA with Parks outlines additional program description. Among the accomplishments in 2003 and the first half of 2004:

- Longfellow Creek Watershed Council (Stewardship Committee) awarded a total of five grants totaling \$77,700 from two public (\$62,000) and three private (\$15,700) sources for restoration and education at SW Thistle open space. Grantors for the project were: Neighborhood matching Fund, Natural Resources Stewardship Network, Ferguson Foundation, Starbucks and the West Seattle Garden Tour; King Conservation District contributed \$12,000 of in kind-match (plants, soil preparation, staff).
- 1,810 plants were installed at SW Thistle site. Continued work on restoring the forested wetland.
- 1,464 volunteer hours contributed toward restoration including corporate events with Washington Mutual, Bon-Macy's, City Year Young Heroes Program and South Seattle Community College, resulting in \$21,664 of match.
- Longfellow Creek Watershed Council meetings seven/year; three new members.
- LCWC chair served as one of five citizen watershed panel members for Council member Paegler's forum on science and creeks.
- Longfellow Creek Stewardship Committee monthly meetings and work parties.
- Fifteen formal tours/presentations delivered to diverse audiences: Native Plant Society Steward Training, Student Conservation Corps Training, SCCC and UW students, Monrail staff and consultants, Delridge District Council, Feet First, Daystar Retirement, Seattle Audubon staff, Our lady of Guadalupe School.
- Created, printed and distributed 2500 copies of Longfellow Creek brochure/map highlighting the Watershed Council work, restoration projects and Legacy Trail.
- Created model for Historical Ecology Project with Washington Trout; recruited, supervised and completed 25 Longfellow Creek Oral History interviews.
- 840 Seattle Public School students participated in 4-hour Watershed education program (integrated with Land and Water classroom unit).
- Provided teacher and Provider (Parks and Homewaters) training for Land and Water Program watershed field trips.
- Facilitated and coordinated Land and Water provider meetings and field trip program resulting in revised programs.
- The LF Watershed Council led the effort to raise community awareness about the water quality impacts of siting the Delridge Monorail station adjacent to the creek. Several community meetings, letters and tours later the site was relocated farther from the creek.

- Four articles in the Seattle P-I; several articles in the West Seattle Herald about Longfellow Creek in relation to stormwater, salmon, or monorail issues.
- Created exhibit on the watershed for three-month display at History House, a community-based organization to connect residents with local history.

Sheryl Shapiro (206) 233-2046

Pipers Creek Watershed Project

The Piper's Creek Watershed Action Plan for the Control of Nonpoint Source Pollution (1990) outlined a series of recommendations, which included providing a Watershed Interpretive Specialist to help develop and coordinate community outreach on watersheds and to improve water quality. A review of the Plan was completed in 2000 that outlined new recommendations to further meet the goals of the Watershed Action Plan. Among the accomplishments in 2003:

- Students from more than 21 schools participated in 3-hour naturalist programs at Carkeek Park. Programs focused on watersheds, habitat and clean water, and included activities on the wetlands and salmon return.
- 15 Salmon and Wetland Stewards received training on a variety of topics related to wetlands and watersheds in Carkeek Park. Along with other volunteers, stewards volunteered over 6,625 hours on public education and stewardship projects in and around Carkeek Park. Sixteen Creek Stewards adopted sites along Piper's Creek in 2003.
- The 2003 Piper's Creek Salmon Return Celebration on November 28th was attended by between 250 and 300 citizens. The celebration featured interpretive walks with translation to non-English languages including Mandarin, Vietnamese, Spanish, and Dutch.
- 150 people attended free programs on watershed friendly gardening and home remodeling in Carkeek's LEED Gold rated Environmental Learning Center. These programs were funded in part through a Public Involvement and Environment (PIE) Fund contract from the Puget Sound Water Quality Action Team. Programs continued in the fall through a partnership with local experts including the Solar Living Inst., Seattle Public Utilities, Seattle Parks and Herrera Environmental Inc.
- The Pipers Creek Watershed Status Report for 2003 was produced and distributed as recommended in the Piper's Creek Watershed Action Plan Review and Course Corrections (2000).
- The Washington State Department of Ecology, summarizing creek sampling since 1992, stated "The available data indicate that fecal coliform concentrations exceed both parts of the water quality criterion at all of the Piper's Creek sites" (DOE Publication Number 03-03-027, "Effectiveness Monitoring for Fecal Coliform Total Maximum Daily Loads in Pipers Creek" June 2003). Follow-up sampling by Ecology in July 2003 showed values exceeding the standard at 2/3 of the sites tested.
- Local citizens made 26 reports of water quality concerns in 2003. Thanks to those timely and accurate calls, 15 of last year's reports were resolved, i.e. the source was located and education or technical assistance was offered.

Beth Miller (206) 684-0877

Taylor Creek and Deadhorse Canyon

Located in Southeast Seattle, Taylor Creek is a small creek that flows from the Skyway District of King County and into Lake Washington at 68th Avenue South. Most of the reach that flows through Seattle proper is within Lakeridge Park and has formed Deadhorse Canyon. Though greatly improved over past years, the area continues to suffer from an infestation of invasive weeds. Volunteers have been trained to recognize invasive weeds and in proper planting techniques for native species. As part of the broader Creek Stewardship Program, the Taylor Creek Stewardship effort provides support to residents concerned with improving the natural habitat of the entire Taylor Creek watershed in general and the Dead Horse Canyon area specifically. Such support includes, but is not limited to, tools and supplies (e.g., bags and tarps), northwest native plants, volunteer recruitment, refreshments, and logistical support. Among the accomplishments during 2003 and the first half of 2004:

- Supported ten regularly scheduled monthly work parties (over 700 volunteer hours).
- Coordinated and supported seven special work parties (over 1500 volunteer hours).
- Supported High School internship program, which trains students to teach elementary school level basic watershed sciences.
- Removed over 80 cubic yards (conservative estimate) of invasive weeds.
- Planted over 1700 plants, including 400 trees. All plants were northwest natives suitable for riparian habitats.
- Removed 1.5 tons of illegal dumping.
- Decommissioned six trails to reduce erosion.
- Expanded the volunteer base of "Friends of Dead Horse Canyon".

Tom Gannon (206) 684-8565 & Bob Spencer (206) 684-4163

Thornton Creek Watershed Program

Starting in January 2003, reconvened the Thornton Creek Watershed Management Committee to review and help implement a Five-Year Action Agenda culled from the draft 2001 Thornton Creek Watershed Action Plan. The committee, which evolved into the Thornton Creek Watershed Oversight Council in Spring 2004, meets once a month to advise the two city partners (Seattle and Shoreline) on program implementation. SPU staffs the committee and facilitates and oversees implementation of priority programs and projects. The latter includes management of the Homewaters Project contract, creek steward program activities in the Thornton Creek watershed, coordination with other city agencies, responding to community issues and implementation of special projects. Among the accomplishments during 2003 and the first half of 2004:

- Most of original committee members are active participants – committee met ten times in 2003 and six times in 2004 through June. Subcommittees form and meet as needed on specific policy or implementation issues.
- In 2003 a Five Year Action Agenda was developed with other agency partners and agreed to by the committee.
- Committee also agreed on a proposed resolution to send to City Council to formally

create the Watershed Oversight Council (still pending).

- Oversaw completion of a community-based restoration project in Littlebrook Creek watershed on private and public property.
- Negotiated MOA in 2003 and in 2004 which provides funding for the Homewaters Project to conduct education programs in the Thornton Creek Watershed. They published five newsletter issues, developed watershed curriculum for teachers and school groups, led three watershed tours, developed and provided three community presentations, and produced a map and brochure of the watershed.

Kathy Minsch (206) 615-1441

3.6.6 Stormwater Outreach and Education

Develop and publish educational materials on what impacts people can have on stormwater runoff and what people can do to protect water quality. Among the accomplishments during 2003 and the first half of 2004:

- Partnered with Surface Water Quality Manager to write and fund two articles "Where Does the Stormwater Go" in 2003 and "Keeping Our Creeks, Lakes and Sound Clean" in 2004 Spring Curb Waste n'Conserve issues, reaching 305,000 customers.
- Coordinated with Resource Conservation Landscape Team lead and King County to adapt the Natural Yard Care fact sheet into an ad form and funded publication in Puget Soundkeeper Alliance Boater's Guide in 2003. Target audience reached was boaters who have yards.
- Developed and sponsored next in series of cartoon ads using Bert the Salmon in 2004. "Be in Tune with the Environment", on the importance of keeping oil and other auto leaks fixed, ran for three weeks on Channel 11 during Summer 2004. Conducted two surveys at local festivals showing a high percentage of those that watched the ad being willing to change what they do.
- Cosponsor for and helped plan two annual Lake Union Cleanup events with Puget Soundkeeper Alliance, with messages about water pollution.
- Updated contact information and reprinted for distribution, as needed, the popular four poster series by the Water Quality Consortium on fertilizing lawns, washing cars, fixing oil leaks, and scooping up dog waste.

Kathy Minsch (206) 615-1441

3.7 ILLICIT DISCHARGES

In addition to the programs described below, investigation of illicit discharges and improper disposal of materials to surface water are also incorporated into a number of programs described elsewhere in this report, including Water Quality Complaints (Section 3.4.2), Business Inspection Program (Section 3.4.3) and TV inspections performed on storm sewers (See 3.8 Operations & Maintenance of Drainage System).

3.7.1 SPU Spill Coordinator/Response Program

SPU implemented a Spill Coordinator Program in 1998 to respond to hazardous material spills occurring in the Seattle service area. The role of the Spill Coordinator is to lead SPU response

activities including: evaluating hazardous substance spills, deciding how best to mitigate and clean up the spill, mobilizing and committing SPU resources, and overseeing the activities of a spill response contractor, if needed. A Spill Coordinator is available 24-hours a day, including weekends, on a rotating 1-week duty schedule. At present, the network consists of twelve Spill Coordinators trained to the Hazardous Materials Emergency Response Technician level. The accompanying matrix shows the spill response experience from 1998-2003:

	1998-99	2000	2001	2002	2003
# of Spills	44	42	70	75	69
SSC response	20	28	60	57	52
Non-duty hour	N/A	12	9	30	28

John Labadie (206) 684-8311

3.7.2 Illegal Dumping

SPU has developed a number of programs to respond to litter and illegal dumping activities in the city and to ensure the efficient collection of litter in public places. The objectives of these programs are to reduce or prevent litter activities, enforce city ordinances, and facilitate community cleanup. An effective illegal dumping program reduces pollution being washed from our streets and alleys into the storm drains and receiving waters. Among the accomplishments in 2003:

- Resolved over 3,000 cases, of which more than 2,600 were reported over the Illegal Dumping Hotline (206-684-7587).
- Provided for the pickup, collection and removal of 2,200,000 pounds¹ of illegally dumped materials on City streets, roads, and public areas. This includes illegally dumped materials along state highways in the city as well as in publicly owned open space.
- Crews cleaned up approximately 5,965 illegal dumpsites from the community in 2003.

Over the first six months of 2004, SPU has resolved over 1,500 cases of which more than 1,300 were reported over the Hotline.

Alex Tonel (206) 684-4170

3.8 OPERATIONS & MAINTENANCE OF DRAINAGE SYSTEM

SPU Drainage and Wastewater Operations Division is responsible for drainage system maintenance. Table 4 and Table 5 list the different activity accomplishments.

¹ The amount of illegally dumped materials may not include litter detail, which is not measured the same as illegally dumped materials. Depending on crew and vehicle availability, clean up may involve more or less frequent litter detail versus illegal dumping as a measure of tonnage.

Table 4. 2003 Quarterly Totals

Main Line Cleaning	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total lineal feet
Hydrocut	482	123	0	0	605
Machine Rodding	176	506	0	518	1,200
Jet Cleaning	4,090	171	0	232	4,493

Main Line TV Inspect	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total lineal feet
TV Line	4,816	1,793	2,106	2,663	11,378

Table 5. 2003 Drainage Maintenance

Activity	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
Mechanical Clean-Catch basin/Sand box	1,077	1,591	977	731	4,386
Manual Clean Inlets	2,926	3,723	1,959	2,723	11,331
Power Rodding (lineal feet)	1,652	2,817	1,787	657	6,913
Inspect Catch Basin/Sand Box	4,856	6,812	2,213	2,596	16,477
Repair/Replace Drain Structure	76	78	69	23	246
Maintain Ditches (lineal feet)	17,243	55,325	21,533	12,063	106,164
Closed circuit TV Inlet/Outlet Pipes (lineal feet)	1,831	341	20	63	2,255
Clean Settling Basins/Ponds	6	16	9	17	48
Jet Cleaning (lineal feet)	14,099	13,911	9,970	9,516	47,496
Clean Bridge Drains	145	190	83	115	533
Hydrocut (lineal feet)	0	0	0	175	175

Pat Gorham (206) 386-9730

3.9 OPERATIONS AND MAINTENANCE OF ROADWAYS

Seattle Department of Transportation (SDOT) Street Maintenance Division has a staff of approximately 65 field and management personnel involved in street sweeping and de-icing. The City has seven sweepers that follow a schedule (weather permitting) of cleaning public streets and roads. Industrial and commercial areas are regularly swept on a rotating basis. Bike paths are cleaned approximately once a month. In addition, roadways known to receive a significant number of leaves receive repeated visits during autumn. Street cleaning crews also respond to emergency calls, for example oil spills on the roadway, that are typically cleaned up with absorbent pads, brooms or sphagnum. During freezing weather, the City uses sand and anti-icing and deicing products to aid traffic. After winter storms, street sweepers pick up any remaining sand. In 2003, approximately 34,699 curb miles of streets were swept. Litter control is the responsibility of the SPU Community Services Division, which coordinates a number of volunteer programs to help keep the City's roadways clean, such as Adopt-a-Street, Neighborhood Cleanup, and Spring Clean. Table 6 shows the 2003 SDOT Street Maintenance accomplishments and expenditures for drainage-related work.

Table 6. Selected 2003 expenditures for Street Maintenance

Activity	Accomplishments (Units)	2002 Expenditures
Mechanical sweeping	34,698.5 Curb Miles	\$1,158,788
Street flushing	233 Work Miles	\$6,857
Alley flushing	2,806 Alley Blocks	\$101,310
Snow & ice response	8,687 Labor Hours	\$250,507

In 2003, SDOT street maintenance workers received training in erosion and sediment control, and best practices for roadway maintenance (Regional Road Maintenance Program). They also were introduced to SDOT's Environmental Management System. They were challenged to identify environmental aspects and impacts of their work, a critical step in the implementation of SDOT's Environmental Management System.

Jim Dare (206) 684-5319

3.9.1 ESA Regional Roads Maintenance Program

In 2003, the City of Seattle began implementing the Regional Road Maintenance ESA Guidelines (RRMP). During this year, the City updated many of its standard operating procedures for maintenance activities in the right of way to be consistent with the RRMP. In addition, the City sent over 60 people to RRMP training courses. The City also began developing an erosion and sediment control training program that: 1) meets requirements expected in the City's next NPDES Stormwater Management Permit and RRMP; and 2) provides a forum for city departments to discuss the success or failure of their erosion and sediment control measures. The City will consolidate elements of the RRMP and new training program into a single program called the Stormwater Cooperative. This program will be completed by December 2004.

Sandy Gurkewitz (206) 684-8574

3.10 MUNICIPAL TRAINING

3.10.1 Drainage Maintenance Crew Training – Standard Operating Procedures

In 2001, SPU initiated a program designed to address routine maintenance and repair work on drainage infrastructures located within environmentally sensitive areas. Such areas include both fish and non-fish bearing streams, plus ditches that have the potential to impact creeks. Standard Operating Procedures (SOPs) have been developed as part of this maintenance program, describing appropriate Best Management Practices (BMPs) to be included as part of the maintenance activity to protect the creek in which work was being conducted and the resources downstream of the work area. The focus of each SOP was to avoid adversely impacting water quality, primarily by containing loose sediment and containing turbidity to inside the isolated work area. The SOPs were developed to provide guidance and standards to drainage maintenance crews that conduct routine maintenance to the drainage infrastructure within environmentally sensitive areas on a regular basis. In 2003, the program received full SEPA review and was permitted under the Washington Hydraulic Code. The program addresses the following activities:

- *Sediment Removal* - the removal of excess sediment from the drainage system including, catchbasins, culverts and deposition areas within creeks and ditches, that is creating a conveyance problem;
- *Creek Structure Maintenance* - re-anchoring, repair, removal, or replacement of creek structures (rock or boulder weirs, logs, root wads, El-wood, boulders) placed in the creek as part of a restoration project;
- *Ditch Cleaning/Reshaping* - cleaning/reshaping of ditches that have potential to impact a creek;
- *Culvert Repair* - repair of culverts located within creeks or ditches with potential to impact a creek;
- *Minor Bank Stabilization* - stabilization of stream and in-line pond banks, and the banks of ditches that have potential to impact a creek. This work only includes minor stabilization that can be considered maintenance to prevent bank sloughing or continued erosion;
- *Hydrocutting* - hydrocutting of roots, grease and miscellaneous debris within pipes located within a sensitive area or ditch with potential to impact a creek in order to provide proper conveyance;
- *Trash And Debris Management* - removal of trash and organic debris from creeks and from ditches that have potential to influence a creek;
- *On-Line Pond Maintenance* - general maintenance work within a retention/detention pond that is hydraulically connected to a creek. Work could include, but is not restricted to, sediment removal, repair or replacement of natural structures, such as LWD, repair of existing culverts, debris and trash removal, or vegetation establishment and maintenance.

Crews conducting this kind of work receive ongoing training in these SOPs.

In 2004 the Drainage and Wastewater Division implemented a training program developed by the Seattle Stormwater Coop that addresses all soil disturbing activities wherever they occur. This program utilizes a comprehensive list of known practices that minimize soil disturbance and protect the surrounding area from runoff. The program incorporates a checklist to determine where the potential for air and water quality violations exist and how to mitigate them before the project is implemented. This program covers all activities that can potentially contaminate air or water bodies within the Drainage and Wastewater Division.

Gary Lockwood (206) 684-7750

3.11 INFORMATION & DATA COLLECTION, MANAGEMENT & ANALYSIS

This section highlights some of the activities conducted during this reporting period the support decision making, project design, and programmatic modifications. It includes not only on-going data collection and analysis efforts, but also summarizes some of the underlying tools that support data and information management.

3.11.1 Information Support Programs

Precipitation Monitoring

Currently, there are 17 rainfall-monitoring stations located throughout the city. No major

upgrades, expenditures, or maintenance were performed in 2003. Table 7 provides average monthly rainfall accumulation. The average annual rainfall accumulation in Seattle in 2003 was 34.53 inches.

Table 7. Average Monthly Accumulations in 2003 in inches

Jan	6.05	Jul	0.17
Feb	1.44	Aug	0.42
Mar	5.04	Sep	0.91
Apr	2.29	Oct	5.02
May	1.06	Nov	5.42
Jun	0.66	Dec	6.05

Hai Bach (206) 684-5139

Surface Water Quality Database

SPU staff maintain several Microsoft Access databases, including surface water quality complaint investigations, business inspections, Lower Duwamish superfund inspections, drainage system inspections and monitoring and sampling data. In 2003 and 2004, a new database was developed with the help of a consultant to combine the business inspections, Duwamish Superfund inspections and the drainage system inspections. In 2003 and 2004, SPU coordinated with King County in an effort to streamline storage for flow monitoring data.

Ellen Stewart (206) 615-0023

GIS Support

The history of Seattle's Geographic Information System (GIS) dates back to the mid-1980s. Evolving from a small installation in the former Seattle Engineering Department, the City's GIS was originally built to improve the way the City manages and operates its utility infrastructure. Seattle's GIS capabilities are now firmly entrenched within the daily business functions of most City Departments. Available GIS data can be combined to produce a wide variety of maps and/or to perform analysis. The system is used to inform decision makers and planners, help deliver services to the public, dispatch Police and Fire personnel, and manage City real estate. The City of Seattle's GIS base map, referred to as the Central Geographic DataBase (CGDB), consists of six GIS databases. These six base layers are the foundation for the City's geographic systems environment and are the shared layers to which all other thematic GIS layers are spatially registered. The CGDB is composed of the legal layer (lots, plots and plats), the survey control layers, Parcels, the Street Network database, Topography and the Orthophoto layer. This set of base layers is accurate to +/- 1 to 2 feet and was constructed using a combination of existing coordinate information, Global Positioning Satellite (GPS) surveys, photogrammetric densification, and calculations based on plat information and other survey data. The result is one of the most spatially accurate sets of GIS base layers in the country.

SPU's operational Sewer and Drainage GIS layer contains over four million records representing all sewer and storm mainlines and service connections. It was built over a period of three years from two main information sources: the Side Sewer Cards and the original CAD-based Truck Set maps. Today's system is maintained by a SPU staff of three and produces a variety of hard copy custom and standard map sets (e.g., 200-scale maps, Truck Set maps). City and Utility staff have direct access to the data through easy-to-use custom interfaces.

The primary focus for the Drainage and Wastewater (DWW) GIS continues to be data accuracy. The majority of 2003 and 2004 resources have been devoted to synchronizing the DWW GIS with SPU's Work Management System. Other efforts of significant impact to the data have been: adding missing pipe data, correcting errant data deemed to be critical to SPU's management and planning of the infrastructure, pipe criticality ranking, and a review/correction of all data representing CSO infrastructure. Also worth mentioning was the third quarter 2003 completion of the Side Sewer Permit Backlog project. This project eliminated the backlog of side sewer as-builts, which had not yet been updated into GIS.

Harvey Arnone (206) 233-0028

Ditch and Culvert Inventory

The Ditch and Culvert Inventory project represents on-going and expanded data collection, analysis, and management of the city's informal drainage system (i.e., ditch and culvert). The majority of this effort was completed in 2003. Work with the University of Washington has resulted in a report that outlines optimal ditch design factors and includes: (1) categorization of ditch types (e.g., "normal" ditches, those within close proximity to a creek, those near landslide-prone areas) that can be mapped on the City's GIS drainage layer; and (2) determination of what these different ditch types require in terms of design specifications. Requirements will vary based on site characteristics and objectives. In addition, guidance for ditch operation and maintenance was developed (also in coordination with UW) that includes factors such as public safety, water quality, proximity to landslide areas, type of street, infiltration potential and geographic location.

Darla Inglis (206) 233-7160

Stormwater Structural BMP Mapping

Structural BMPs have been mapped using GPS and a GIS database of these sites. This task was completed in 2003. The mapping identifies the location and type of BMP, which also supports maintenance crews establishing maintenance schedule for the various sites. Locations of BMP facilities will be continue to be updated as they are built.

Albert Ponio (206) 615-1345

Basin & Creek GIS Delineation

Beginning in the fall of 2001, SPU began updating the creek watershed boundaries in GIS for Thornton, Taylor, Fauntleroy, Longfellow, Schmitz and Pipers creeks using new and revised ditch, culvert and topographical information. Within each of these creek watersheds, SPU has also been delineating outfall sub-basins using GIS mainline data, topography, and ditch and culvert data. As of August 2004, the watershed boundary and sub-catchment boundary delineations are 100% complete. In 2002, SPU began also annotating smaller creek basin boundaries and started delineating drainage basin boundaries for major outfalls discharging into the City's receiving water bodies. As of August 2004, these delineations are 95% complete.

Scott Reese (206) 733-9172

3.11.2 Receiving Waters

Longfellow Creek Investigation

In 2003, SPU sponsored a Seattle University student project to evaluate water quality and aquatic health conditions in Longfellow Creek and to assess whether operations at the West Seattle Golf Club have had a significant impact on stream health. The study included an assessment of pesticide usage and timing, benthic invertebrate sampling, and analysis of water quality data. The project, completed in June 2003, also included recommendations for reducing impacts from golf course operations.

Beth Schmoyer (206) 386-1199

Water Quality Basin Studies

In 2003, SPU initiated water quality investigations in the Densmore and South Park drainage basins to evaluate water quality conditions and assess the need for stormwater quality improvements. These studies are being conducted to augment hydrologic/hydraulic studies that were recently completed in these two basins. For the Densmore basin, the analysis is focusing on evaluating potential water quality impacts on Green Lake from proposed drainage system improvements and identifying opportunities to incorporate stormwater treatment into both the trunkline and local drainage systems. For the South Park basin, the analysis is focusing on potential stormwater and sediment quality issues associated with a stormwater pump station that is being considered to reduce local flooding problems. Work was temporarily suspended in September 2003 due to a budget shortfall. The South Park investigation was restarted in early 2004 and is expected to be completed in 2005. The contract for the Densmore work is currently being renegotiated and will restart in September 2004.

Beth Schmoyer (206) 386-1199

Urban Creeks Watershed Analysis

The Urban Creeks Watershed Analysis is a study assessing the condition of five salmon-bearing watersheds in the City of Seattle – Thornton, Piper's, Longfellow, Taylor and Fauntleroy creeks. The purpose of the study is to provide a technical information base for decision-makers planning projects and programs that affect fish and habitat in Seattle's creeks. The study assesses fish use in each system, including existing and potential distribution, passage for migration, changes in the annual distribution of spawning activity and of smolt (juvenile) production. An analysis of physical data is currently underway to help develop an understanding of how watershed processes affect the availability and condition of habitat in each system. Physical data include: habitat quality and quantity, channel conditions, riparian conditions, geology and land uses. Field inventories are completed, and the data are being managed in Access Database and in the City of Seattle's Geographic Information System (GIS).

Katherine Lynch (206) 233-5194

Aquatic Community Assessment Program

SPU continues to use regionally developed sampling protocol, converting the raw data into the regionally accepted Benthic Index of Biotic Integrity (B-IBI.) In 2003, thirteen Seattle sites were sampled in Thornton and Pipers Creeks. An experimental sampling site was attempted at Licton Springs, but it proved to be quite contaminated with garbage. Benthic macro-

invertebrates were collected at these sites by volunteers. The results of the 2003 sampling have not yet come back from the lab, but when the results are received at SPU, a summary of the data results will be sent to the volunteers who helped collect the data. SPU will continue to collect three replicate samples per site, with three square feet of creek bed sampled per replicate. In 2004, SPU has teamed with King County to participate in King County's Normative Flow project, which will involve using SPU's BIBI scores to look at the relationship between flows and biological integrity in Thornton Creek.

Laura Reed (206) 615-0551

Storm Event Sampling

A storm event is defined as a storm that lasts for a minimum of four hours and contributes at least 0.1 inches of rain with an antecedent dry period (less than 0.01 inches of rain) of at least eight hours. Storm event samples (flow-weighted composite samples) are collected at the following four locations:

Pipers Creek basin:

Venema Creek at the mouth

Pipers Creek at footbridge downstream of Venema Creek

Pipers Creek above orchard

Longfellow Creek at Yancy Street

For the period December 2002 through June 2004, storm samples were collected at the three Pipers Creek stations on the following dates:

December 12, 2002

February 16, 2004

During the same period, samples were collected during the following two storm events at the Longfellow Creek station:

December 10, 2002

October 16, 2003

February 16, 2004

During Fall 2003, storm event sampling was conducted on Longfellow Creek in support of NOAA's Northwest Fisheries Science Center pre-spawn Coho mortality study. Flow-weighted composite samples and multi-parameter monitoring sonde data were collected on the following dates:

September 24, 2003

October 16, 2003

November 11, 2003

Analytical reports from these and previous storm sampling events are retained in an electronic database and hard copy files maintained by SPU staff.

Mike Hinson (206) 733-9134

Coho Pre-spawn Mortality Investigation

Over the last few years, SPU has been working with other resource agencies to investigate the cause of the high levels of coho salmon pre-spawn mortality that have been observed in urban

creeks in the Puget Sound area. In 2003, SPU, King County, and U.S. Geological Survey collected stormwater samples in Longfellow Creek and Des Moines Creek (in unincorporated King County) to support coho mortality studies conducted by the National Oceanic and Atmospheric Administration (NOAA). SPU also continues to support coho spawning surveys in Longfellow and other urban creeks in Seattle.

Laura Reed (206) 615-0551

3.11.3 CIP Support & Effectiveness Monitoring

Hydrologic and Water Quality Monitoring of Natural Systems

SPU has also been actively implementing and conducting performance evaluations of City-designed natural drainage systems (NDS) projects. These projects include 1) SEA Street (NW Seattle; completed in 2001), 2) Broadview Green Grid (NW Seattle; majority complete by 2004), 3) Viewlands Swale (NW Seattle; completed 1998), and 4) Highpoint Housing Redevelopment (SW Seattle; under construction and anticipated completion 2005). These projects represent retrofits to the existing drainage infrastructure, and monitoring objectives focus on flow control and/or water quality. Monitoring (water quality and/or flow) has been implemented for all the projects listed above. Specifics on the Broadview and Highpoint projects are listed below.

Broadview Area. In 2003, SPU began evaluating the performance of City-designed natural drainage systems (NDS) that have been installed to retrofit existing drainage systems in the Broadview-Greenwood area of north Seattle. These NDS are designed to provide both flow control (infiltration and detention) and water quality treatment (infiltration with some biofiltration). In 2003, monitoring stations were installed at the NW 107th and NW 120th St sites to begin evaluating pre-construction conditions. Samples were analyzed for standard stormwater pollutants (total suspended solids, fecal coliform bacteria, total and dissolved metals, and NWTPH-Dx). In addition, Ecology provided funding to analyze samples for pesticides. The project sampling and analysis plan was reviewed and approved by Ecology in 2003. Seven samples were collected at the outlet of the existing ditch/culvert system on NW 107th before construction began in 2004. Construction will be completed in late 2004 and flow monitors will be installed at three additional stations to measure flow through the NDS. Water quality monitoring will begin after vegetation is well established.

Fourteen samples were collected at the NW 120th site. Baseline monitoring will continue in 2004-2005. No project has yet been developed for this area.

Highpoint. In 2003, SPU collected three pre-construction samples at the downstream end of the existing drainage system serving the Highpoint NDS site. This Seattle Housing Authority project will convert a 1940's era housing project to a mixed-use area that will contain 1,600 housing units and community facilities such as a public library and medical/dental clinic. The project is being constructed in separate phases. Site demolition was completed in 2003, and construction of the north end of the site began in 2004. South end construction will begin in 2005. The project design incorporates a number of innovative stormwater management technologies, including natural drainage system designs and porous pavement, along with a standard wet pond system. In 2004, a sampling plan will be developed to monitor the quality of stormwater discharged from the project and to evaluate performance of some of the innovative stormwater management techniques that are being employed on the Highpoint project.

Beth Schmoyer (206) 386-1199

CIP Performance Evaluation

During 2003 and the first half of 2004, SPU continued a long-range monitoring program for SPU creek restoration projects to determine whether or not they are meeting their design goals. (The type of monitoring conducted at each project site is driven by the goals of the project.) High priority in-stream construction projects are located in Pipers Creek, Thornton Creek, Longfellow Creek, Fauntleroy Creek and Taylor Creek. The following types of structures are monitored: log weirs, rock weirs, an "el-wood" structure, off-channel pools, bank protection, gravel introduction, pool addition, fish passage weirs, lunkers, root wads, and riparian replanting. The purpose of CIP effectiveness monitoring is to provide information on the level of improvement or protection afforded a water body as a result of the constructed system or BMP. This information will refine stormwater management decisions and advance the benefits gained by strategically investing in the most effective activities and projects.

The following table (Table 8) shows the distribution of new sites requiring monitoring through time. Each site is monitored intensively during the summer months for the first three years. All of the sites are monitored periodically during the rest of the year.

Table 8. Number of CIP Performance Sites

Year	No. of sites requiring monitoring
1999	8
2000	5
2001	3
2002	4
2003	4
2004	3
Total	27

A technical report, summarizing the information gained from three years of monitoring for the sites constructed in 2000 was completed in the spring of 2004.

Laura Reed (206) 615-0551

BMP Effectiveness Monitoring

Stormfilter Testing

The City of Seattle, along with Washington State Department of Transportation (WSDOT), and the City of Tacoma, is evaluating the performance of a Stormfilter system manufactured by Stormwater Management, Inc. The system, installed at the WSDOT I-5 test facility, is set up to conduct side by side testing of two filter media: a perlite/zeolite mix and a perlite/zeolite/granular activated carbon mix. The Stormfilter system is being evaluated for its ability to remove typical stormwater pollutants (e.g., total suspended solids, total phosphorus, and metals) and organic compounds such as phthalates and petroleum hydrocarbons. Testing began in October 2003. Samples were collected during five storm events between October 2003 and February 2004. Tacoma is providing funding to continue testing in 2004-2005.

Beth Schmoyer (206) 386-1199

Swirl Concentrator Testing

SPU is also evaluating the performance of a Downstream Defender, Vortechs, and Stormceptor

swirl concentrator under a grant from Ecology. Field sampling at the Downstream Defender and Vortechs sites began in 2001 and sampling of the Stormceptor unit began in January 2004. The following numbers of storm events have been sampled at each of the test sites:

Test site	January – December 2003	January – June 2004	Project to date
Downstream Defender	7	0	18
Vortechs	8	0	18
Stormceptor	0	5	5

Samples were analyzed for total suspended solids, total phosphorus, soluble reactive phosphorus, NWTPH-Dx, and metals (copper, lead, and zinc). The final project report will be submitted to Ecology in September 2004.

Beth Schmoyer (206) 386-1199

3.11.4 ESA Information

Urban Blueprint for Habitat Protection and Restoration

Seattle's urban environment represents highly impacted habitats, requiring an adaptive management strategy to determine the best and most scientifically valuable actions to take. In June 2001, the City of Seattle completed a draft *Urban Blueprint for Habitat Protection and Restoration*, and the final Blueprint was issued in December 2003, following extensive public and peer review. The Urban Blueprint analyzes chinook salmon behavior within five extant aquatic environments within the city and identifies important habitat attributes to protect and restore. Future supplemental science reports will be issued as findings result from our continued research program.

Based upon the blueprint's findings and continuing research, the City of Seattle is continuing to focus on the following actions:

- Protecting the Puget Sound Shoreline. Protecting and restoring gravel beaches, eel grass beds and other shallow areas that provide plentiful food, refuge and spawning areas for other fish that chinook eat.
- Restoring Shallow Habitat along Lake Washington, Lake Union and the Ship Canal. Providing juvenile salmon with shallow shoreline areas, free of bulkheads and other structures, where they can feed and escape bass and other predators.
- Improving Shallow and Side-channel Habitats in the Industrial Duwamish Waterway. Restoring tidal flats, wetlands, side channels and other areas where juveniles can feed and rest, while growing and adjusting to saltwater.
- Making Migration through the Ballard Locks Safer. Developing ways for adult and juvenile salmon to get past the Locks quickly and unharmed.
- Updating Local Regulations. Among regulations under review are Seattle's critical area ordinance, storm water code, and shoreline master plan. The City's Comprehensive Plan will also incorporate where appropriate findings from the Blueprint and additional salmon habitat research findings.

In 2004, the Mayor is expected to commit the City, through an interdepartmental initiative, to prioritize investments using a science driven evaluation framework to achieve specific improved states for Seattle's discrete aquatic environments.

The *Urban Blueprint for Habitat Protection and Restoration* report is available at

<http://www.ci.seattle.wa.us/salmon/blueprintdoc.htm>

Martin Baker (206) 684-5984

3.12 CAPITAL IMPROVEMENT PROGRAMS

In 2003, SPU constructed several Capital Improvement Program (CIP) projects that included water quality elements. Some of the principal projects are listed below.

Darla Inglis (206) 233-7160

3.12.1 Natural Systems

Seattle Public Utilities has developed a "Natural Drainage Systems" approach to managing stormwater that integrates water quality treatment and infiltration into the planting strip of the street right-of-way. This approach uses swales with plants and amended soils to reduce stormwater runoff, lower pollutant levels and, in many instances, improve neighborhood quality with plantings and pedestrian access.

Broadview Green Grid Project

The Broadview Green Grid project, Seattle Public Utilities' most ambitious Natural Drainage System project to date, involves 15 city blocks. The project constructs natural infrastructure to manage stormwater flow from an approximately 32-acre sub-basin of the Piper's Creek Watershed. The project will benefit Piper's Creek by reducing the occurrence of large, fast flows of water that erode the creek channel and habitat and transport pollutants common to the urbanized areas in the upper parts of the watershed. The project's natural drainage system features, which include swales, cascades, ponds, increased vegetation and reduced impervious areas, slow the water down and give maximum opportunity for stormwater to infiltrate, helping sustain creek flows and reduce water temperatures as well as giving pollutants maximum time to settle out. SPU is partnering with Seattle Department of Transportation (SDOT) to provide neighborhood-scale improvements that integrate landscaping, traffic calming, and a sidewalk on each north-south street into the Natural Drainage System design. Construction is nearing completion on this project that began in late August 2003. The project includes a "Cascade" system for 107th Street, from 4th to Phinney Avenues, similar to the cascade constructed along 110th Street in 2002 and improvements similar to those of the "SEA Street" pilot project constructed in 2000-2001 along 2nd and 1st Avenues NW and along Palatine and Phinney Avenues N, between 107th and 110th Streets.

James Johnson (206) 684-5829

High Point Project – A Natural Systems Approach

SPU is partnering with Seattle Housing Authority to incorporate natural drainage systems in the High Point mixed income redevelopment in West Seattle. Over 120 acres, High Point is located in the Longfellow Creek watershed, and makes up nearly 10% of the watershed. SHA's redevelopment project will replace the existing High Point development with new streets, new

utilities, and 1600 units of housing. The High Point Natural Drainage System Plan integrates over 11,000 linear feet of vegetated and grassy swales that are modified from the SEA Streets pilot to fit into a traditional curb-and-gutter street. Each swale will manage the runoff from the adjacent street and block of housing. In addition porous pavement sidewalks and up to three porous pavement streets (1st residential street application in the Northwest) will reduce the overall impervious surface of the redevelopment. Finally, design guidelines for the residential properties will include impervious surface reduction incentives and downspout dispersion techniques. The performance of the plan has been predicted based on a block-scale HSPF model. Model results indicate that the plan combined with the pond will meet Seattle's Stormwater Code for peak flow control as well as match the peak and duration for the 2-year pre-developed pasture condition. City Council has approved the Subdivision Master Use Permit and Street Vacations application. Ground-breaking occurred in June 2004, and the porous pavement street and first natural drainage system swales are expected to be completed this fall. Base monitors are in place at the discharge point and in Longfellow Creek to evaluate pre- and post-development flow and water quality.

Miranda Maupin (206) 386-9133

3.12.2 Urban Creeks – Urban Creeks Legacy

The Urban Creeks Legacy was initiated in 1999 to provide a holistic approach to managing stormwater drainage and improving habitat in Seattle's creeks. Working side-by-side with dedicated citizens, Seattle Public Utilities (SPU) achieved significant progress toward our program goals, which include:

- Improving creek drainage and water quality systems;
- Improving natural creek habitat for fish and other wildlife;
- Enhancing creek health through stewardship and education; and
- Celebrating our creeks and the citizens who care for them.

Among the accomplishments during 2003:

Thornton Creek Watershed. SPU completed three detention ponds at Jackson Park Golf Course to reduce downstream flooding and protect downstream habitat from high flows. The project relocated and restored 2,500-ft of open channel and added native vegetation along the banks.

During 2003, SPU modified a culvert under Lake City Way and built a fish ladder to improve fish passage. For the first time in over fifty years, coho and sea-run cut-throat trout have been able to access an additional 2,000-ft of stream. During Summer 2004, SPU made some minor adjustments to ensure the functioning of this fish ladder.

SPU completed enhancement plans for Thornton Creek Park 6, a 6.5-acre natural area near the headwaters of the south branch. During the summers of 2003 and 2004, SPU added large woody debris and boulders to a 350-ft reach and 200-ft of creek. The restoration work also included the addition of native vegetation along the creek.

Longfellow Creek Watershed. In 2003, SPU began design on a project to modify the remaining fish passage barriers along lower Longfellow Creek. The project will remove barriers

and improve instream habitat and riparian vegetation in the West Seattle Golf Course. Later in the year, SPU cancelled this project because the responsibility for fish passage at this location lay primarily with another department.

Taylor Creek Watershed. In 2003, SPU resolved on-going challenges to design a fish passage project near the mouth of Taylor Creek. SPU purchased a key parcel in the project area and has proceeded with design. In mid 2004, 30% designs were developed. This project will increase salmon accessible habitat from 500-ft to nearly a mile.

Fauntleroy Creek Watershed. In 2003, SPU completed design efforts to modify the creek to reduce erosion and sediment transport as well as improve instream habitat diversity. SPU obtained permits and materials. In 2004, SPU added large woody debris and boulders to nearly one mile of habitat in publicly owned sections of Fauntleroy Creek.

Mapes Creek. SPU is working with the Army Corps of Engineers to restore the mouth of Mapes Creek. The project is in the reconnaissance/concept stage. If approved for Army COE funding, the project will install a new dedicated pipe for creek water, daylight the lowest section of creek, and create a creek mouth/delta. The primary purpose of the project is to improve habitat to benefit juvenile chinook.

Chris Woelfel (206) 684-7599

3.12.3 Other Water Quality Projects

Westlake Drainage Project

In 2001, Seattle Public Utilities began construction of a project along Westlake Avenue near Lake Union to replace a failing drainage system and install several different stormwater treatment facilities. Incorporated into this project are access points for these facilities to allow for performance evaluation. These facilities will reduce pollutants entering Lake Union from stormwater runoff. Work on this project continued into 2002 and was completed in 2003.

Richard Smith (206) 684-5012

Jackson Park Detention

Three detention ponds with a total storage volume of 25 acre-feet were constructed adjacent to the north branch of Thornton Creek to reduce downstream flooding and erosion problems. To improve fish and wildlife habitat, approximately 2,300 feet of the creek channel was enhanced with large woody debris, rock and ponds. Native vegetation was planted and fish passage barriers removed. Approximately 2.5 acres of riparian wetland was created and enhanced with native vegetation. Design and restoration of golf course features were successfully coordinated with the Jackson Park Golf Course Master Plan to maintain playability, enhance the aesthetic appeal of the golf course, and increase efficiency of the irrigation system. This project was completed in 2003. Monitoring activities to fulfill permit requirements have been carried out since then. A total of 12 shallow groundwater monitoring wells were installed in May 2004 to monitor the wetland soil hydrology.

Lilin Li (206) 684-7610

4. OTHER PERMIT REPORTING REQUIREMENTS

4.1 LEGAL AUTHORITY

Adequate legal authority to control discharges to and from Seattle's storm drainage systems has been established. In 2000, revisions were made to the City's Stormwater, Grading and Drainage Control Code (Seattle Municipal Code 22.800 – 22.808). In August 2001, Ecology issued revised guidance in its Stormwater Management Manual for Western Washington. In early 2002, the City began a comprehensive comparison of its current set of Stormwater requirements to Ecology's newly revised guidance. In 2004 staff continues to evaluate and perform technical analysis required for upcoming code revisions.

4.2 IMPLEMENTING STORMWATER PROGRAM COMPONENTS

All program components have been implemented and are proceeding in accordance with the City's Stormwater Management Program (SWMP), as approved by Ecology on July 24, 1997.

4.3 KNOWN CHANGES IN WATER QUALITY

Based on the City's data, there were no known significant changes in the water quality of the City's receiving water bodies since the last update.

4.4 CONTROL OF INDUSTRIAL DISCHARGES INTO MS4s

Seattle's Stormwater, Grading and Drainage Control Code (SMC 22.800 – 22.808) prohibits most non-stormwater discharges from being introduced into the City's municipal storm sewer system, including harmful discharges from industrial activities. Seattle's Side Sewer Code (SMC 22.16.300) also prohibits discharging certain substances into the storm drain system. Additionally, as part of the City's Stormwater Pollution Prevention and Complaint Investigation Programs, Surface Water Quality Investigators conduct investigation when there is evidence of stormwater contamination originating from industrial discharges.

4.5 CHANGES IN PERMIT COVERAGE AREA

There were no changes in permit coverage area in 2003, and none are anticipated in 2004.

4.6 EXPENDITURES FOR STORMWATER PROGRAM

In July 1999, two year after Ecology approved Seattle's Stormwater Management Program, Seattle implemented a new financial management program called Summit. The primary driver behind the Summit Project was the year 2000 problem, which necessitated replacing the previous financial management program (Seattle Financial Management System, or SFMS). Transitioning from SFMS to Summit required developing an entirely new set of organizational, accounting and activity cost codes. In comparison to the data available when Seattle prepared its 1997 SWMP, the coding structure in Summit allows for a much more detailed accounting of budgeted and actual costs incurred. However, in many cases, specific stormwater program costs remain blended with other stormwater programs costs, making an accurate categorical breakdown difficult. This, coupled with organizational changes within SPU and other Seattle Departments since the 1997 SWMP was drafted, means that estimating stormwater program expenditures is both an objective and subjective exercise.

Table 9 provides a rough approximation of the actual overall stormwater management budget. Many City Departments other than SPU and SDOT are involved in programs that could arguably

be included in these estimates. A good example would be the joint effort between the Department of Parks and Recreation and Office of Sustainability and the Environment reducing the use of pesticides in City parks. However, in keeping with the methodology used in previous reports, the estimates below are based primarily on SPU and SDOT expenditures. In many cases, owing to the internal organization of SPU, many general management and support functions are jointly funded by drainage, drinking water, wastewater and solid waste funds. In these cases, an assumed fraction of the total costs (typically 25% - 30%) was allocated to stormwater-related programs. It is not intended that these estimates serve as a modification of budget estimates made in previous reports. Instead, these estimates should be viewed as a refinement of the estimate provided in the past, but still a macro-scale analysis of stormwater program operating costs.

Table 9. Overall Stormwater Management Program Budget (Actual Expenditures)

Program	2003 Actual
Drainage O&M	\$ 3,104,000
Street O&M	\$ 1,517,000
Pollution Prevention Programs	\$ 541,000
Public Education Programs	\$ 890,000
Regulatory Development & Enforcement	\$ 319,000
Monitoring Program	\$ 396,000
Other Stormwater Program Costs	\$ 2,710,000
Overall Stormwater Program Budget	\$ 9,477,000

Drainage O&M: Includes SPU Field Operations Branch budgets for drainage inspection, drainage cleaning, and drainage repair, and an estimated portion of the overall branch support costs. Also included are expenses related to Conservation Corps and spot drainage program conducted by SPU.

Street O&M: Includes SDOT budgets for mechanical street sweeping, street flushing, alley flushing, and snow/ice response. Not included in the above table are budgets for litter pick-up (approximately \$1.5 million) and illegal dumping (approximately \$600,000).

Pollution Prevention Programs: Includes a variety of programs designed to reduce pollutants at their sources, primarily involving activities conducted by SPU's Community Services Division.

Public Involvement, Education & Stewardship Programs: Includes SPU's water quality and urban creek efforts such as the Salmon in the Schools program, Urban Creeks and Watershed Stewardship Team, and Stormwater Outreach and Education programs.

Regulatory Development & Enforcement: Includes estimated SPU costs for water quality complaint investigations, and business inspections. It also includes the work begun in 2002 to compare Seattle's existing codes and technical standards to Ecology's 2001 Manual guidance.

Monitoring Program: Includes expenditures for surface water quality monitoring.

Other Stormwater Program Costs: Includes estimated proportions of general program management, WRIA Planning, and other support and planning costs. They do not include ESA programs.

Darla Inglis (206) 233-7160

4.7 REVISIONS TO FISCAL ANALYSIS

In accordance with Section S9 of Seattle's NPDES Municipal Stormwater permit, a permit modification is required if there is a greater than 20-percent difference between the *projected* annual budget value contained in the City's SWMP (Table 9.7 in the 1997 SWMP) and the actual budget *adopted* by the City Council for that year. The projected annual budgets contained in Seattle's 1997 SWMP ended with fiscal year of 2000. For comparison purposes, the projected figure for 2000 was \$5,885,474.

5. CLOSING COMMENTS

Seattle's urban landscape differs from many surrounding communities in that *new development* is quite rare. Additionally, Seattle has a very low rate of *redevelopment*, where an urban property undergoes change but retains its urban land use. In fact, Seattle's rate of redevelopment is less than one percent per year. Furthermore, of these redevelopment projects, only a fraction of them are large enough to trigger regulations requiring stormwater treatment and/or flow control facilities. This means that while development regulations play a role in reducing adverse impacts of stormwater runoff, progress toward improving the quality of Seattle's urban must include:

- A suite of stormwater programs aimed at reducing pollutants at or near their sources;
- An on-going maintenance and operations program designed to keep our infrastructure operating properly; and
- A municipal capital improvement program based on placing the appropriate technologies at targeted locations.

Looking ahead, we are committed to better understanding how best to utilize the above techniques of urban stormwater management. Seattle, with its fully built urbanized environment, is in a distinctive position to implement and evaluate new and unique stormwater management strategies. In some areas of the City, for example where the drainage system is primarily ditches and culverts, an increasing emphasis is being placed on targeted retrofits using a natural system design approach. In other areas of the City, where more formalized curb and gutter drain systems are present, a set of programs focusing on infrastructure maintenance and pollution prevention actions may be the most cost-effective approach for improving water quality. Over time we will continue to adjust and enhance our efforts as our knowledge increases and the state-of-the-practice improves.

The City of Seattle has been involved in managing stormwater runoff since the late 1800s, when the first drainage systems were constructed in response to typhoid and diphtheria epidemics and recurring damage caused by flooding. Stormwater management has evolved since those early days and the City has expanded the level of service beyond flood control and human health risks, embracing actions that aim to improve overall surface water quality and enhance aquatic habitats. We remain committed to meeting the challenges of managing stormwater in our urban environment today and into the future.

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APPENDICES

APPENDIX A - STORMWATER MANAGEMENT PROGRAM MANAGERS

Stormwater Management Program	Program Manager
Aquatic Community Assessment Program	Laura Reed (206) 615-0551
Basin & Creek GIS Delineation	Scott Reese (206) 733-9172
BMP Effectiveness Monitoring	Beth Schmoyer (206) 386-1199
Broadview Green Grid Project	James Johnson (206) 684-5829
Business Inspection Program	Ellen Stewart (206) 615-0023
Capital Improvement Programs	Darla Inglis (206) 233-7160
CIP Support & Effectiveness Monitoring	Beth Schmoyer (206) 386-1199
Citizen Advisory Committee	Carlton Stinson (206) 684-7624
Coho Pre-spawn Mortality Investigation	Laura Reed (206) 615-0551
Comprehensive Drainage Plan Update	Darla Inglis (206) 233-7160
Coordination among NPDES Municipal Stormwater Permittees	Darla Inglis (206) 233-7160
Creek Steward Program	Bob Spencer (206) 684-4163
Densmore Drainage Basin	Gary Schimek (206) 615-0519
Ditch and Culvert Inventory	Darla Inglis (206) 233-7160
Drainage Maintenance Crew Training – Standard Operating Procedures	Gary Lockwood (206) 684-7750
Drainage Plans and Permit Approval	Ken Watanabe (206) 233-7912
Drainage System Inspection Program	Ellen Stewart (206) 615-0023, Louise Kulzer (206) 733-9162
Environmental Education Team	Anthony Matlock (206) 386-9746
Environmental Grant Funding	Anthony Matlock (206) 386-9746
ESA Regional Roads Maintenance Program	Sandy Gurkewitz (206) 684-8574
ESA Team	Martin Baker (206) 684-5984
GIS Support	Harvey Arnone (206) 233-0028
Green Gardening Program	Carl Woestwin (206) 684-4684
Green Home Kit Program	Michael Davis (206) 615-1376
Hazardous Material Inventory	Shab Zand (206) 233-5172
Hazardous Material Reduction	Shab Zand (206) 233-5172
High Point Project – A Natural Systems Approach	Miranda Maupin (206) 386-9133
Household Hazardous Waste Program	Kathy Minsch (206) 615-1441
Hydrologic and Water Quality Monitoring of Natural Systems	Beth Schmoyer (206) 386-1199
Illegal Dumping	Alex Tonel (206) 684-4170
Interagency Resource for Achieving Cooperation	Ellen Stewart (206) 615-0023
Jackson Park Detention	Lilin Li (206) 684-7610
Lake Union Action Team	Darla Inglis (206) 233-7160
Local Hazardous Waste Management Program	Kathy Minsch (206) 615-1441
Longfellow Creek Investigation	Beth Schmoyer (206) 386-1199
Longfellow Creek Watershed Project	Sheryl Shapiro (206) 233-2046
Lower Duwamish River Sediment Cleanup and Restoration	Martin Baker (206) 684-5984

Appendix A - Stormwater Management Program Managers (continued)

Stormwater Management Program	Program Manager
Lower Duwamish Waterway Source Control Program	Beth Schmoyer (206) 386-1199 & Tanya Treat (206) 615-1636.
Natural Lawn and Garden Care Campaign/Natural Soil Building	Carl Woestwin (206) 684-4684
Norfolk Drainage Basin	Gary Schimek (206) 615-0519
Operations & Maintenance of Drainage System	Pat Gorham (206) 386-9730
Operations and Maintenance of Roadways	Jim Dare (206) 684-5319
Pesticide Free Parks	Barb Decaro (206) 615-1660 or Tracy Morgenstern (206) 386-4595
Pesticide Reduction	Tracy Morgenstern (206) 386-4595
Pipers Creek Watershed Project	Beth Miller (206) 684-0877
Precipitation Monitoring	Hai Bach (206) 684-5139
Pollution Prevention Direction-finding	Louise Kulzer (206) 733-9162
Resource Venture	Louise Kulzer (206) 733-9162
Salmon in the Schools	Carlton Stinson (206) 684-7624
South Park Drainage Basin	Gary Schimek (206) 615-0519
SPU Spill Coordinator/Response Program	John Labadie (206) 684-8311
Storm Drain Stenciling	Carlton Stinson (206) 684-7624
Storm Event Sampling	Mike Hinson (206) 733-9134
Stormfilter Testing	Beth Schmoyer (206) 386-1199
Stormwater Outreach and Education	Kathy Minsch (206) 615-1441
Stormwater Structural BMP Mapping	Albert Ponio (206) 615-1345
Stormwater, Grading and Drainage Control Code and Directors' Rules	Rick Johnson (206) 233-7861
Surface Water Planning Unit	Denise Andrews (206) 684-4601
Surface Water Quality Database	Ellen Stewart (206) 615-0023
Taylor Creek and Deadhorse Canyon	Tom Gannon (206) 684-8565 & Bob Spencer (206) 684-4163
Thornton Creek – Basinwide Flow Control Plan	Gary Schimek (206) 615-0519
University of Washington Center for Water and Watershed Studies	Darla Inglis (206) 233-7160
Urban Blueprint for Habitat Protection and Restoration	Martin Baker (206) 684-5984
Urban Creeks – Urban Creeks Legacy	Chris Woelfel (206) 684-7599
Urban Creeks and Watershed Stewardship Team	Kathy Minsch (206) 615-1441
Water Quality Basin Studies	Beth Schmoyer (206) 386-1199
Water Quality Complaints	Ellen Stewart (206) 615-0023
Westlake Drainage Project	Richard Smith (206) 684-5012
Watershed Forums	Sarah McKearnan, WRIA 8 (206) 615-0567; Judith Noble, WRIA 9 (206) 684-8078
Watershed Resource Inventory Area (WRIA) Coordination	Sarah McKearnan, WRIA 8 (206) 615-0567; Judith Noble, WRIA 9 (206) 684-8078; Scott Powell, WRIA 7 (206) 386-4582; Ed Connor, WRIAs 3&4 (206) 615-1128

APPENDIX B – PERMIT REPORTING REQUIREMENTS CROSS-REFERENCE

The table below cross-references the reporting requirements contained in the 1995 NPDES Municipal Stormwater Permit with the appropriate sections contained in this report.

Permit Reporting Requirement	Req't No.	Cross-referenced Section in this Report
Status of implementing the components of the stormwater management program.	S10.B.1	3.1 - Comprehensive Stormwater Planning (p. 7) 3.3 - Regulations & Technical Standards (p. 15) 3.7 - Illicit Discharges (p. 34) 3.8 - Operations & Maintenance of Drainage System (p. 36) 3.9 - Operations and Maintenance of Roadways (p. 36) 3.10 - Municipal Training (p. 37) 3.11 - Information & Data Collection, Management & Analysis (p. 38) 3.12 - Capital Improvement Programs (p. 46) 4.1 - Legal Authority (p. 49)
Changes in permit coverage area:	S10.B.2	4.5 - Changes in Permit Coverage Area (p. 49)
Expenditures for stormwater program	S10.B.3	4.6 - Expenditures for Stormwater Program (p.50)
Revisions to fiscal analysis	S10.B.4	4.7 - Revisions to Fiscal Analysis (p. 51)
Summary and analysis of cumulative monitoring data (4th Year Report only)	S10.B.5	Not applicable
Summary of compliance activities, inspections, and education activities	S10.B.6	3.4 - Permitting, Inspections & Enforcement (p. 16) 3.4.6 - Lower Duwamish Waterway Source Control Program(p. 21) 3.6 - Public Involvement, Education, Stewardship (p. 27)
Known changes in water quality	S10.B.7	4.3 - Known Changes in Water Quality (p. 49)
Status of watershed-wide coordination activities	S10.B.8	3.2 - Partnerships (p. 10)